Series 1951, No. 8

Issued September 1960

SOIL SURVEY

Loudoun County Virginia

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
VIRGINIA AGRICULTURAL EXPERIMENT STATION

HOW TO USE THE SOIL SURVEY REPORT

THIS SOIL SURVEY of Loudoun County will serve various groups of readers. It will help farmers and livestock men in planning the kind of management that will protect their soils and provide good yields; assist engineers in selecting sites for roads, buildings, ponds, and other structures; and add to the knowledge of soil scientists.

In making this survey, soil scientists walked over the fields and through the woodlands. They dug holes and examined surface soils and subsoils; noticed differences in growth of crops, weeds, and grasses; and, in fact, recorded all the things that they thought might affect the suitability of the soils for farming, engineering, livestock production, and related uses.

The scientists plotted the boundaries of the soils on aerial photographs. From the photographs, cartographers prepared the detailed soil maps in the back of this report on which woods, pastures, roads, streams, and many other landmarks are shown.

Locating the soils

Use the index to map sheets to locate areas on the large map. The numbered rectangles on the index map show the parts of the county covered by each of the soil maps. Select the sheet showing that part of the county on which your farm is located. The boundaries of the soils are outlined in red, and there is a symbol for each soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map. Suppose, for example, an area located on the map has a symbol Ed. The legend for the detailed map shows that this symbol identifies Elioak silt loam, undulating phase. This soil, and all the others mapped in the county, are described in the section The Soils of Loudoun County.

Information on the soils

Special sections of this report will interest different groups of readers. The parts which discuss the physiography, climate, water supply, vegetation, and other facts about the county will be of interest to those not familiar with the area.

Farmers and those who work with farmers can learn about the soils in the section The Soils of Loudoun County. After the scientists had mapped and studied the soils, they judged what use and management each soil should have. Then, they listed it in a capability unit; that is, a group of soils that need similar management and respond in about the same way. For example, Elioak silt loam, undulating phase, is placed in capability unit IIe–2. The management this soil needs, therefore, will be stated under the heading Capability unit IIe–2 in the section Use and Management of Soils. The farmer who has Elioak silt loam, undulating phase, on his farm will want to study the table on productivity ratings in this same section. This table tells what crops can be produced on this soil under two levels of management.

Engineers will want to refer to the section Engineering Properties of Soils. The table in this section shows the texture of the soil layers, permeability, depth to bedrock, depth to water table, and other characteristics that affect engineering.

Soil scientists will find information about how the soils were formed and how they are classified in the section Genesis, Morphology, and Classification of Soils.

If you find that you need help in farm planning, consult the county agricultural agent or the local representative of the Soil Conservation Service. Supervisors of the Northern Virginia Soil Conservation District will arrange for you to get technical help on a farm conservation plan. Members of the staff of your State agricultural experiment station will also be glad to help you.

Fieldwork for this survey was completed in 1950. Unless otherwise indicated, statements in this report refer to conditions in the county at that time.

U.S. GOVERNMENT PRINTING OFFICE: 1960

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

Contents

Page

General character of the area 1
Location and extent 1
Physiography, relief, and drainage 1
Climate 2
Soil associations 2
Rough land 3
1. Rocky land and Very rocky land, basic rock phases-Clifton 3
2. Rocky land and Very rocky land, acidic rock phases-Airmont 3
Soils on crystalline rocks of Piedmont Plateau 3
3. Eubanks-Chester 3
4. Chester-Brandywine (loams and silt loams) 4
5. Chester-Brandywine (loams and sandy loams) 4
6. Hazel-Whiteford-Worsham 4
7. Belvoir-Worsham-Chester 4
8. Brandywine-Chester-Eubanks 4
9. Glenelg-Manor-Elioak 5
10. Myersville-Catoctin-Fauquier 5
Soils on sandstone and shale of Piedmont Plateau 5
11. Bucks-Penn-Calverton 5
12. Penn-Calverton-Croton 5
13. Bucks (cobbly)-Penn (stony)-Calverton 6
14. Iredell-Mecklenburg-Rocky land 6
15. Legore-Montalto 6
16. Kelly-Brecknock-Catlett 6
17. Brecknock-Catlett-Croton 6
18. Catlett-Brecknock-Croton 7
19. Calverton-Readington-Croton 7
20. Penn-Penn (cobbly)-Bucks 7
Soils on limestone of Piedmont Plateau 7
21. Athol-Emory 7
Soils on colluvial or alluvial deposits 7
22. Dyke-Unison-Elbert 7
23. Chewacla-Congaree-Wehadkee 8
24. Braddock-Thurmont 8
25. Rowland-Bowmansville-Bermudian 8
26. Hiwassee-Masada 8
27. Captina-Robertsville-Elk 9
28. Huntington-Lindside-Melvin 9
Use and management of soils 9
Principles of soil management 9
Capability groups of soils 10
Management by capability units 11
Capability unit I–1 11
Capability unit IIe–1 22
Capability unit IIe–2 22
Capability unit IIe–3 22
Capability unit IIe–4 23
Capability unit IIw–1 23
Capability unit IIIe–1 23
Capability unit IIIe–2 23
Capability unit IIIe–3 24
Capability unit IIIe–4 24
Capability unit IIIe–5 24
Capability unit IIIe–6 24
Capability unit IIIe–7 24
Capability unit IIIe–8 24
Capability unit IIIw–1 25
Capability unit IIIw–2 25
Capability unit IIIs–1 25
Capability unit IVe–1 25
Capability unit IVe–2 26
Capability unit IVw–1 26
Capability unit IVs–1 26
Capability unit IVs–2 26
Capability unit IVs–3 26
Capability unit Vw–1 26
Capability unit VIe–1 27

Use and management of soils—Continued
Management by capability units—Continued
Page
Capability unit VIe–2 27
Capability unit VIs–1 27
Capability unit VIs–2 27
Capability unit VIs–3 27
Capability unit VIs–4 27
Capability unit VIs–5 28
Capability unit VIIe–1 28
Capability unit VIIe–2 28
Capability unit VIIe–3 28
Capability unit VIIs–1 28
Capability unit VIIs–2 28
Productivity ratings 29
Engineering properties of soils 35
Engineering data 35
The soils of Loudoun County 42
Soil series and their relations 42
Soil series, types, and phases 47
Airmont series 48
Airmont stony loam, hilly phase 49
Airmont stony loam, undulating phase 49
Airmont stony loam, rolling phase 49
Athol series 49
Athol silt loam, undulating phase 49
Athol gravelly silt loam, undulating phase 50
Athol gravelly silt loam, rolling phase 50
Athol rocky silt loam, undulating phase 50
Athol rocky silt loam, rolling phase 50
Athol very rocky silt loam, undulating phase 50
Athol very rocky silt loam, rolling phase 51
Belvoir series 51
Belvoir loam 51
Bermudian series 51
Bermudian silt loam 51
Bowmansville series 52
Bowmansville silt loam 52
Braddock series 52
Braddock gravelly loam, undulating phase 52
Braddock gravelly loam, rolling phase 53
Braddock cobbly loam, undulating phase 53
Braddock cobbly loam, rolling phase 53
Brandywine series 53
Brandywine loam and silt loam, rolling phases 53
Brandywine loam and silt loam, hilly phases 54
Brandywine loam and silt loam, eroded hilly phases 54
Brandywine loam and silt loam, steep phases 54
Brandywine sandy loam, rolling phase 54
Brandywine sandy loam, hilly phase 54
Brandywine sandy loam, steep phase 55
Brandywine stony loam, rolling phase 55
Brandywine stony loam, hilly phase 55
Brandywine stony loam, eroded hilly phase 55
Brandywine stony loam, steep phase 55
Brandywine stony sandy loam, undulating phase 55
Brandywine stony sandy loam, rolling phase 55
Brandywine stony sandy loam, hilly phase 56
Brecknock series 56
Brecknock gravelly silt loam, undulating phase 56
Brecknock gravelly silt loam, rolling phase 57
Buckingham series 57
Buckingham stony fine sandy loam, rolling phase 57
Buckingham stony fine sandy loam, steep phase 57
Bucks series 57
Bucks silt loam, undulating phase 58
Bucks cobbly silt loam, undulating phase 58
Bucks cobbly silt loam, rolling phase 59
Calverton series 59
Calverton silt loam, undulating phase 59

The soils of Loudoun County—Continued
Soil series, types, and phases—Continued
Calverton series—Continued
Page
Calverton silt loam, level phase 59
Captina series 60
Captina silt loam 60
Captina silt loam, high terrace phase 60
Catlett series 61
Catlett gravelly silt loam, undulating phase 61
Catlett gravelly silt loam, rolling phase 61
Catlett stony silt loam, undulating phase 61
Catlett stony silt loam, rolling phase 61
Catlett stony silt loam, eroded rolling phase 62
Catlett stony silt loam, hilly phase 62
Catoctin series 62
Catoctin silt loam, rolling phase 62
Catoctin silt loam, hilly phase 62
Catoctin silt loam, eroded hilly phase 63
Catoctin silt loam, steep phase 63
Catoctin silt loam, eroded steep phase 63
Catoctin stony silt loam, rolling phase 63
Catoctin stony silt loam, eroded rolling phase 63
Catoctin stony silt loam, hilly phase 63
Catoctin stony silt loam, eroded hilly phase 63
Catoctin stony silt loam, steep phase 63
Catoctin stony silt loam, eroded steep phase 63
Chester series 63
Chester loam, undulating phase 64
Chester silt loam, undulating phase 64
Chester loam and silt loam, undulating phases 64
Chester loam and silt loam, rolling phases 65
Chester-Brandywine loams and sandy loams, undulating phases 65
Chester-Brandywine loams and sandy loams, rolling phases 66
Chewacla series 66
Chewacla silt loam 66
Clifton series 67
Clifton stony silt loam, undulating and rolling phases 67
Congaree series 67
Congaree silt loam 67
Congaree fine sandy loam 68
Croton series 68
Croton silt loam, level phase 68
Croton silt loam, undulating phase 69
Dyke series 69
Dyke cobbly silty clay loam, undulating phase 69
Dyke cobbly silty clay loam, eroded rolling phase 69
Elbert series 70
Elbert silt loam, level phase 70
Elbert silt loam, undulating phase 70
Elbert stony silt loam, colluvial phase 70
Elioak series 71
Elioak silt loam, undulating phase 71
Elioak silt loam, rolling phase 71
Elioak silt loam, hilly phase 72
Elk series 72
Elk loam 72
Emory series 72
Emory silt loam 72
Eubanks series 73
Eubanks-Chester loams and silt loams, undulating phases 73
Eubanks-Chester loams and silt loams, rolling phases 74
Eubanks-Chester stony loams and silt loams, undulating phases 74
Eubanks-Chester stony loams and silt loams, rolling phases 74
Eubanks-Chester stony loams and silt loams, hilly phases 74
Fauquier series 75
Fauquier silt loam, undulating phase 75
Fauquier silt loam, rolling phase 75
Fauquier silt loam, hilly phase 75
Fauquier stony silt loam, rolling phase 75
Fauquier stony silt loam, hilly phase 76
Fauquier silty clay loam, eroded undulating phase 76
Fauquier silty clay loam, eroded rolling phase 76
Fauquier silty clay loam, eroded hilly phase 76
Fauquier silty clay loam, severely eroded rolling phase 76

The soils of Loudoun County—Continued
Soil series, types, and phases—Continued
Fauquier series—Continued
Page
Fauquier silty clay loam, severely eroded hilly phase 76
Glenelg series 76
Glenelg silt loam, undulating phase 77
Glenelg silt loam, rolling phase 77
Glenelg silt loam, hilly phase 77
Hazel series 77
Hazel silt loam, rolling phase 78
Hazel silt loam, hilly phase 78
Hazel silt loam, steep phase 78
Hiwassee series 78
Hiwassee loam, undulating light surface variant 78
Hiwassee cobbly loam, undulating light surface variant 79
Hiwassee cobbly loam, rolling light surface variant 79
Huntington series 79
Huntington silt loam 79
Iredell-Mecklenburg complex 80
Iredell-Mecklenburg silt loams, undulating phases 81
Iredell-Mecklenburg silt loams, eroded undulating phases 81
Iredell-Mecklenburg silt loams, rolling phases 82
Iredell-Mecklenburg silt loams, eroded rolling phases 82
Iredell-Mecklenburg stony silt loams, undulating and rolling phases 82
Kelly series 82
Kelly silt loam, undulating phase 82
Kelly silt loam, level phase 83
Legore series 83
Legore silt loam, undulating shallow phase 83
Legore silt loam, rolling shallow phase 83
Legore silt loam, hilly shallow phase 84
Legore stony silt loam, undulating shallow phase 84
Legore stony silt loam, rolling shallow phase 84
Legore stony silt loam, hilly shallow phase 84
Legore stony silt loam, steep shallow phase 84
Lindside series 84
Lindside silt loam 84
Manassas series 85
Manassas silt loam 85
Manor series 85
Manor silt loam, rolling phase 86
Manor silt loam, hilly phase 86
Manor silt loam, steep phase 86
Masada series 86
Masada loam, undulating phase 86
Masada cobbly loam, undulating phase 87
Meadowville series 87
Meadowville silt loam 87
Meadowville silt loam, cobbly variant 88
Meadowville loam 88
Melvin series 88
Melvin silt loam 88
Mixed alluvial land 89
Mixed alluvial land 89
Montalto series 89
Montalto silt loam, undulating shallow phase 89
Montalto stony silt loam, undulating shallow phase 90
Montalto stony silt loam, rolling shallow phase 90
Myersville series 90
Myersville silt loam, undulating phase 90
Myersville silt loam, rolling phase 91
Myersville silt loam, hilly phase 91
Myersville silt loam, eroded hilly phase 91
Myersville stony silt loam, undulating phase 91
Myersville stony silt loam, rolling phase 91
Myersville stony silt loam, steep phase 92
Myersville stony silt loam, eroded steep phase 92
Penn series 92
Penn loam, undulating phase 92
Penn loam, rolling phase 92
Penn loam, hilly phase 92
Penn silt loam, undulating phase 93
Penn silt loam, eroded undulating phase 93
Penn silt loam, rolling phase 93
Penn silt loam, eroded rolling phase 93
Penn silt loam, hilly phase 93
Penn shaly silt loam, eroded undulating phase 94

The soils of Loudoun County—Continued
Soil series, types, and phases—Continued
Penn series—Continued — Page
Penn shaly silt loam, eroded rolling phase — 94
Penn shaly silt loam, eroded hilly phase — 94
Penn shaly silt loam, eroded steep phase — 94
Penn cobbly silt loam, undulating phase — 94
Penn cobbly silt loam, rolling phase — 94
Penn stony silt loam, eroded hilly phase — 95
Penn stony silt loam, eroded steep phase — 95
Readington series — 95
Readington silt loam, undulating phase — 95
Robertsville series — 95
Robertsville silt loam — 95
Rocky land — 96
Rocky land, rolling acidic rock phase — 96
Rocky land, hilly acidic rock phase — 96
Rocky land, rolling basic rock phase — 96
Rocky land, hilly basic rock phase — 96
Rohrersville series — 97
Rohrersville silt loam — 97
Rohrersville stony silt loam — 97
Rowland series — 98
Rowland silt loam — 98
Sequatchie series — 98
Sequatchie loam — 98
Stony colluvial land — 99
Stony colluvial land, rolling and hilly phases — 99
Thurmont series — 99
Thurmont gravelly loam, undulating phase — 99
Thurmont gravelly loam, rolling phase — 100
Thurmont cobbly loam, undulating phase — 100
Thurmont cobbly loam, rolling phase — 100
Trego series — 100
Trego gravelly silt loam — 100
Unison series — 101
Unison silt loam, undulating phase — 101
Unison silt loam, rolling phase — 102
Unison stony silt loam, undulating phase — 102
Unison stony silt loam, rolling phase — 102
Very rocky land — 102
Very rocky land, acidic rock phase — 102
Very rocky land, basic rock phase — 102
Wehadkee series — 102
Wehadkee silt loam — 102
Whiteford series — 103
Whiteford silt loam, undulating phase — 103
Whiteford silt loam, rolling phase — 103
Whiteford silt loam, hilly shallow phase — 104
Whiteford stony silt loam, rolling phase — 104
Whiteford stony silt loam, hilly phase — 104

The soils of Loudoun County—Continued
Soil series, types, and phases—Continued — Page
Wickham series — 104
Wickham loam — 104
Worsham series — 104
Worsham silt loam — 104
Genesis, morphology, and classification of soils — 105
Factors of soil formation in Loudoun County — 105
Parent materials — 105
Climate — 105
Plant and animal life — 106
Relief — 106
Age — 106
Classification of soils — 107
Zonal soils — 107
Red-Yellow Podzolic soils — 107
Gray-Brown Podzolic soils — 110
Reddish-Brown Lateritic soils — 111
Intrazonal soils — 112
Planosols — 112
Low-Humic Gley soils — 113
Azonal soils — 113
Lithosols — 113
Alluvial soils — 114
Additional facts about the county — 114
Water supply — 114
Vegetation — 115
Organization, settlement, and population — 115
Transportation, market, and community facilities — 115
Agriculture — 116
Size and type of farms and farm tenure — 116
Crops — 116
Livestock and livestock products — 116
Forest products — 116
Farm improvements — 116
Fertilizer and lime — 116
Glossary — 116
Literature cited — 118

LIST OF TABLES

TABLE 1.—Temperature and precipitation at Lincoln, Loudoun County, Virginia — 2
TABLE 2.—Suitable crops, cropping systems, and supplementary practices — 12
TABLE 3.—Productivity ratings for crops and pasture — 30
TABLE 4.—Properties of the soils important to engineering — 36
TABLE 5.—Principal characteristics of the soil series — 44
TABLE 6.—Acreage and proportionate extent of the soils — 47
TABLE 7.—Acreage of the principal crops and number of fruit trees and grapevines of bearing age — 116

SOIL SURVEY OF LOUDOUN COUNTY, VIRGINIA

BY H. C. PORTER, IN CHARGE, C. S. COLEMAN, W. J. MEYER, A. Y. STOKES, AND A. G. SHERRELL, VIRGINIA AGRICULTURAL EXPERIMENT STATION; H. H. BAILEY, J. B. CARTER, K. E. FUSSELL, A. H. SBAR, AND W. J. WELCH, SOIL SURVEY,[1] UNITED STATES DEPARTMENT OF AGRICULTURE[2]

CORRELATION BY W. E. HEARN AND W. S. LIGON, SOIL SURVEY

UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH THE VIRGINIA AGRICULTURAL EXPERIMENT STATION

LOUDOUN COUNTY was formed in 1757. The county, bordered on the north and east by the Potomac River, is in the northern Piedmont and Blue Ridge provinces. The topography varies sharply; elevations above sea level range from 180 to 1,900 feet. A good drainage system has developed. Forest covers nearly all of the mountains, although most of the merchantable timber has been cut. Agriculture is the main source of income and centers around livestock and livestock products. Leading crops are small grain, corn, alfalfa, pasture and hay, and orchardgrass for seed.

General Character of the Area

In this section, the area and location of the county are given, and some of its natural features are discussed.

Location and Extent

Loudoun County is in the northeastern part of Virginia (fig. 1). Leesburg, the county seat, is approximately in the east-central part of the county. The Potomac River separates the county from Washington, Frederick, and Montgomery Counties in Maryland. On the west, Loudoun County is bounded by Clarke County, Va., and Jefferson County, W. Va. On the south, it is bordered by Fauquier and Prince William Counties and, on the east, by Fairfax County. Loudoun County has an area of 517 square miles, or 330,880 acres.

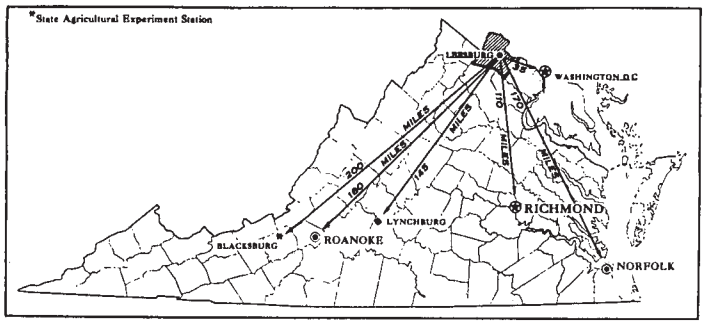


Figure 1.—Location of Loudoun County in Virginia.

Physiography, Relief, and Drainage

Loudoun County lies within the northern Piedmont and Blue Ridge provinces (*1*).[3] In Virginia these provinces lie between the Ridge and Valley province on the west and the Coastal Plain province on the east. The northern Piedmont province is subdivided into the Piedmont Upland and Piedmont Lowland (or Triassic Lowland).

The well-dissected Piedmont Upland division comprises about 50 percent of the county. It is underlain mainly by granodiorite and schist rock materials. The Piedmont Upland covers western Loudoun County, although a very small part is in the northeastern corner of the county. The interstream areas are fairly wide. They are characterized chiefly by undulating and rolling relief, except in small places along the lower tributaries of the larger streams. Entrenchment along the lower tributaries of these streams has been rapid, and, as a result, bluffs and V-shaped valleys rise abruptly from the flood-plain levels. The generally smooth upland is about 600 feet above sea level, but it slopes gently toward the east. The Piedmont Upland is drained by the tributaries of Goose Creek and Little River in the southern part and by Catoctin Creek and its tributaries in the northern part. The drainage pattern is generally dendritic, or treelike. Only a very small portion of the soils requires drainage for cultivation. Flood plains in the area are narrow. They occur at elevations below 400 feet in most places.

The Piedmont Lowland (or Triassic Lowland) division comprises about 41 percent of the county in the eastern part, on the lowest elevations of the upland. It is underlain mainly by sedimentary rocks, including shale, sandstone, and conglomerate, as well as some diabase. It is not as deeply dissected as the Piedmont Upland. The

[1] Fieldwork for this survey was done when Soil Survey was part of the Bureau of Plant Industry, Soils, and Agricultural Engineering. Soil Survey was transferred to the Soil Conservation Service on November 15, 1952.

[2] R. C. Jurney, Soil Conservation Service, helped prepare the report.

[3] Italic numbers in parentheses refer to literature cited, p. 118.

general surface relief consists of wide undulating ridges and nearly level areas, but there is a small proportion of rolling, hilly, and steep areas near larger streams. This division has a general slope to the northeast and ranges from 180 to 400 feet above sea level.

Goose Creek, Broad Run, and their tributaries flow in a northeastern direction across the Piedmont (or Triassic) Lowland and empty into the Potomac River. Several tributaries of Bull Run flow southeastward. The Piedmont Lowland has a drainage pattern similar to that of the Piedmont Upland, but it is not as well developed. It has a greater area of soils that require drainage for crop production and has wider flood plains, especially along the Potomac River. Where the Potomac River borders this division on the north, there are fairly wide areas (1 percent of the county) of high and low undulating terrace lands and level to nearly level flood plains.

The Blue Ridge province covers about 9 percent of the county and occurs in four separate areas. These are the Blue Ridge in the extreme western part of the county, the Short Hill in the northwestern part, Catoctin Mountain in the north-central part, and the Bull Run Mountains in the south-central part. This province is underlain by quartzite, sandstone, schist, and greenstone. Nearly all areas have many loose boulders, stones, cobbles, and bedrock outcrops on the surface and in the profile. The mountaintops are fairly narrow. They are generally from 800 to 1,200 feet above the valley uplands and from 1,000 feet to 1,900 feet above sea level on the highest places. The sides of the mountains are hilly and steep. The Catoctin and Bull Run Mountains have the lowest elevations in this province. In general, the drainage systems in the Blue Ridge province are poorly developed except where some of the major streams have cut through several of the lower mountain areas. There are no flood plains. Runoff and internal drainage are generally excessive.

Climate

Loudoun County has a humid, continental climate. The average summer temperature is 74.5° F., and the average winter temperature is 34.2° F. In table 1 are the monthly, seasonal, and annual temperature and precipitation, as recorded by the United States Weather Bureau station at Lincoln.

The average frost-free season is 183 days. The latest killing frost recorded was May 16, and the earliest in autumn was September 23. On an average, the period between April 18 and October 18 is frost free.

The length of the growing season is generally ample for field crops to mature. Late, wet springs may sometimes delay planting so that early fall frosts injure crops before their maturity. This is especially true on some of the moderately well drained and somewhat poorly drained soils.

Areas on the Blue Ridge are cooler and more moist than in the valley area near the Lincoln station. This is indicated by the darker colored A_1 horizons of soils at elevations above 1,000 feet.

TABLE 1.—*Temperature and precipitation at Lincoln, Loudoun County, Virginia*

[Elevation, 500 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1930)	Wettest year (1937)	Average snowfall
	°F.	°F.	°F.	Inches	Inches	Inches	Inches
December	35. 1	73	−11	2. 74	2. 63	0. 64	4. 0
January	33. 4	78	−25	3. 00	2. 39	5. 86	6. 4
February	34. 0	81	−13	2. 61	1. 87	4. 70	5. 7
Winter	34. 2	81	−25	8. 35	6. 89	11. 20	16. 1
March	43. 9	92	6	3. 08	2. 40	2. 20	3. 6
April	53. 2	100	10	3. 31	2. 71	5. 96	. 5
May	64. 3	102	26	3. 60	1. 38	1. 67	[3]
Spring	53. 8	102	6	9. 99	6. 49	9. 83	4. 1
June	72. 1	107	39	4. 73	3. 97	7. 91	[3]
July	76. 7	109	44	3. 44	. 39	3. 51	0
August	74. 7	108	40	4. 26	. 49	9. 31	[3]
Summer	74. 5	109	39	12. 43	4. 85	20. 73	[3]
September	68. 7	108	30	2. 64	. 28	1. 93	[3]
October	57. 3	98	19	3. 01	. 33	11. 26	. 2
November	45. 7	86	5	2. 35	1. 24	2. 66	. 4
Fall	57. 2	108	5	8. 00	1. 85	15. 85	. 6
Year	54. 9	109	−25	38. 77	20. 08	57. 61	20. 8

[1] Average temperature based on a 54-year record, through 1955; highest and lowest temperatures on a 51-year record, through 1952.
[2] Average precipitation based on a 55-year record, through 1955; wettest and driest years based on a 54-year record, in the period 1901–55; snowfall based on a 50-year record, through 1952.
[3] Trace.

Soil Associations

As one travels from place to place to map a county or other large tract, it is fairly easy to see definite differences. There are many obvious differences in shape, gradient, and length of slopes; in course, depth, and speed of the streams; in the width of the bordering valleys; in kinds of native plants; and even in the kinds of agriculture. With these more obvious differences there are less easily noticed differences in the patterns of soils.

By drawing lines around the different patterns of soils on a small map, one can obtain a map of general soil areas, which is called a soil association map. Such a map is useful to those who want a general idea of the soils; who want to compare different parts of a county; or who want to locate large areas suitable for some particular kind of agriculture or other broad land use.

A soil association may contain a few soils or many soils, and these soils may be similar or different. An association generally contains many soils, but as a rule most of them are not important because of their small acreage. In most of the associations, two or three soils are outstanding in the soil pattern. The soil associations are named for the dominant soils in them.

There are five general soil areas in Loudoun County. Each of these is on a characteristic kind of underlying rock. They are (1) rough land, (2) soils on crystalline rocks of Piedmont Plateau, (3) soils on sandstone and shale of Piedmont Plateau, (4) soils on limestone of Piedmont Plateau, and (5) soils on colluvial or alluvial deposits.

These five general areas contain 28 soil associations, which are described in this section. These associations tend to follow exposures of rock formations. In many places, however, there are several associations on similar rock formations. In other places, the soil material consists of colluvial or alluvial deposits.

As a whole, each soil association area is used for different kinds of agriculture and has a different potential for agricultural use. A map of the soil associations of Loudoun County is given at the beginning of the map section in the back of this report.

Rough Land

Rough land consists of the mountains in the western part of the county and hilly areas northwest of Leesburg and northeast of Middleburg.

1. *Rocky land and Very rocky land, basic rock phases-Clifton*

This association consists of stony, steep and hilly, shallow soils over basic rock, mainly agglomerate and chloritic greenstone. It is located on the Blue Ridge, Hogback, and Catoctin Mountains and comprises some 20.1 square miles, or about 3.9 percent of the total county area. The elevation above sea level ranges from about 600 to 1,900 feet. The Clifton soils, which occur only on top of the Blue Ridge Mountains, make up the smaller part of the association.

The Rocky land types are not suitable for crops or pasture and are mostly in forest. The Clifton soils are too stony for row crops, but they may be used for permanent pasture and fruit crops. Summer homes and a small commercial orchard are located on top of the Blue Ridge area, mainly on Clifton soils. There are only a few year-round residents, mostly retired people who are not dependent on farming. The main income is from lumber. The trees are mostly hardwoods.

Good pasture and fruit-bearing trees and shrubs can be established and maintained on the Clifton soils. Woodland and wildlife are good uses for the Rocky land types.

2. *Rocky land and Very rocky land, acidic rock phases-Airmont*

This association consists of stony, steep and hilly, shallow soils over acidic rock, mostly quartzite and some acidic schist. Most areas are on the Blue Ridge, Catoctin, and Bull Run Mountains, and Short Hill. The association comprises 14.5 square miles, or about 2.8 percent of the total county area. The elevation above sea level ranges from 300 to 1,300 feet. Some small areas of Buckingham and Hazel soils and Stony colluvial land are included.

Steep slopes and stoniness make the association unsuitable for crops and pastures, and little acreage is cleared. A few areas of Airmont and Buckingham soils are in pasture, which is generally poor. Little fruit is grown. A few homes are located along Route 9 on top of the Blue Ridge Mountains and on the lower slopes around Short Hill and the Bull Run Mountains. The main income is from lumber.

Pasture can be established and maintained on the smoother and less rocky areas of the Airmont and Buckingham soils. Woodland and wildlife are good uses for the more rocky and hilly Airmont areas.

Soils on Crystalline Rocks of Piedmont Plateau

Soils on crystalline rocks lie mostly between the Blue Ridge Mountains and a line that might be drawn from Aldie in the southern part of the county through a point just west of Leesburg to the Potomac River near U. S. Highway 15.

3. *Eubanks-Chester*

This association consists of deep, undulating to hilly soils of the uplands over basic and acidic granodiorite.[4] It is in the western part of the Piedmont Upland area, between the Blue Ridge and Short Hill and extends south around Round Hill to Airmont and Willisville. The area comprises 49.6 square miles, or about 9.6 percent of the county. The elevation above sea level ranges from 600 to 800 feet. The Eubanks and Chester soils occupy the major part of the association. Small acreages are included of Belvoir, Chewacla, Brandywine, Meadowville, Montalto, Wehadkee, and Worsham soils, as well as Rocky land types, both acidic and basic.

Most areas are undulating and rolling, although some small areas are nearly level to hilly. The underlying rock is mostly granodiorite. It ranges from coarse-grained acidic to fine-grained basic, but it is generally medium-grained moderately basic.

A well-developed drainage system provides good runoff. The soils are well drained, except small areas of Chewacla and Wehadkee soils of the bottom lands, Belvoir soils of the uplands, and Worsham soils of the colluvial slopes.

The elevation is about the same as that of the Chester-Brandywine (loams and silt loams) soil association. The Eubanks-Chester association has more cobbles and stones, slightly steeper slopes, and more rolling relief, and the soils are somewhat less productive and need more intensive management. The surface soils of the Eubanks-Chester association are mostly loam, but there is silt loam, fine sandy loam, sandy loam, coarse sandy loam, and stony loam.

Most farms in this association are large and are generally of the livestock and dairy type. Many homes and farm buildings are large and well-maintained. Five or six small villages are in this association area.

Some of the best soils in the county are in the Eubanks-Chester association. They produce a wide variety of crops.

---

[4] The acidic granodiorites are the light-colored rocks recognized as granodiorites, which are low in dark-colored minerals. Those referred to as basic are high in dark-colored minerals (ferromagnesium minerals).

4. *Chester-Brandywine (loams and silt loams)*

This association consists of deep and shallow, brown, rolling and hilly soils over acidic granodiorite. It occurs on the broader upland ridges between drainageways in the Piedmont Upland area. It is one of the most extensive associations and comprises 107.5 square miles, or 20.8 percent of the total county area. The elevation above sea level ranges from 450 to 550 feet.

Most of the association consists of Chester and Brandywine soils. The Chester soils, which occur on the smoother ridgetops, comprise up to 80 percent of the association in most places. The Brandywine soils generally occur on ridge sides. Also in this association are small acreages of the Meadowville and Worsham soils of the colluvial slopes; Chewacla and Wehadkee soils of the first bottoms; Eubanks soils of the uplands; and Belvoir soils, partly on the uplands and partly in colluvial areas around drainage heads, upland flats, and slope bases.

Some of the best agricultural soils of the county are in this association. The smooth, workable soils are well suited to intensive cultivation. Most of the acreage is in crops. A small part is in woodlots and idle areas. Most farms are of fairly good size and are mainly of the livestock and dairy type.

5. *Chester-Brandywine (loams and sandy loams)*

This association consists of deep and shallow, coarse-textured, rolling and hilly soils over coarse-grained acidic granodiorite. It is in the southern part of the Piedmont Upland area around Middleburg and Mountville and southwest of Unison. The association comprises 16 square miles, or 3.1 percent of the total county area. The elevation above sea level ranges from 450 to 550 feet.

This association consists mostly of Chester and Brandywine soils. Small areas of Eubanks, Montalto, Meadowville, Worsham, Belvoir, Chewacla, Congaree, and Wehadkee soils are included.

The Chester-Brandywine (loams and sandy loams) association has a fairly well developed dendritic drainage system. Runoff is medium to moderately rapid in most areas. Internal drainage is medium in the Chester soils and rapid to very rapid in the Brandywine soils. The included Wehadkee and Worsham soils are poorly drained, the Congaree, Eubanks, and Montalto are well drained, the Meadowville are well to moderately well drained, and the Belvoir and Chewacla are somewhat poorly to moderately well drained.

The hazard of erosion is generally moderate on the soils of this association. Stones, cobbles, and bedrock outcrops occur locally, mainly on Brandywine soils. The Chester soils are excellent soils and suitable for all local crops. However, because of their close intermingling with the sandy, rolling, and choppy Brandywine soils, they cannot be used separately in many places.

6. *Hazel-Whiteford-Worsham*

This association consists of steep and hilly, shallow to moderately deep soils over phyllitic slate, basic and acidic schist, and arkosic sandstone. It occurs in the northern part of the county on the Blue Ridge and Short Hill. It comprises only 3.6 square miles, or 0.7 percent of the total county area. The elevation above sea level ranges from 450 to 900 feet. This association is bounded by the Buckingham and Chester soils and Rocky land types in most places.

The drainage pattern is well developed, except on small areas of Worsham soils. Runoff is rapid to very rapid. Internal drainage is medium to rapid. The hazard of erosion is moderate to very high. Relief is similar to that of the Glenelg-Manor-Elioak association.

This association is made up mostly of Hazel soils. The Whiteford soils compose about 30 percent. Airmont, Brandywine, Chester, Meadowville, and Worsham soils make up a small percentage.

Much of the area is in permanent pasture and forest. The smoother parts of the Whiteford soils are in crops. This association is not suited to cultivation because of the steep and hilly relief, shallowness, and stoniness in some places. Only a few farm homes and farms are completely within the association. Most of them overlap into the Eubanks-Chester association.

7. *Belvoir-Worsham-Chester*

This association consists of mostly poorly and somewhat poorly drained, gently undulating soils over granodiorite. It is located in five widely scattered areas near Willisville, Eubanks, and Lovettsville in the Piedmont Upland area. The total area of this association is 26.3 square miles, or 5.1 percent of the county. The elevation above sea level ranges from 500 to 600 feet. Most areas occupy broad drainage divides.

Belvoir loam makes up the largest acreage. About 20 percent is Chester and Worsham soils. Brandywine and Eubanks soils make up a small acreage.

The drainage pattern is poorly developed. Runoff is mostly moderately slow and slow. Internal drainage is very slow to slow in the Belvoir and Worsham soils, medium in the Chester, and rapid in the Brandywine soils. The Belvoir soil has a hardpan about 18 inches below the surface. In places, the Worsham and Belvoir soils have developed from colluvial material, mostly along the sides and near the heads of drainageways.

Most areas of this association are cleared. The Belvoir and Chester soils are used mostly for corn, small grain, and mixed hay. The Worsham areas are mostly in pasture. The somewhat poorly to moderately well drained Belvoir soil is well suited to mixed hay crops. The poorly drained Worsham soils are best suited to permanent pasture unless drained. The inextensive, well-drained Chester soils are well suited to all local crops.

The association has a fair supply of ground water, but the depth to the water table is slightly deeper than for soils on lower elevations. Wells are the main source of water and are less than 100 feet deep in many places. Some fairly good springs occur.

8. *Brandywine-Chester-Eubanks*

This association consists of chiefly shallow, sandy, brown soils over acidic granodiorite. It is located on hilly and steep relief in the central part of the county and near Goose, Catoctin, and Beaverdam Creeks. It comprises 24.8 square miles, or 4.8 percent of the county area. The elevation above sea level ranges from 400 to 550 feet. Stony types of Brandywine soils compose most of the association. There are small areas of Chester and Eubanks soils.

Some rock ledges and angular cobbles and stones interfere with cultivation. The underlying granodiorite rock material is coarse to fine grained.

The drainage system is well developed. Runoff is mostly rapid to very rapid. There is an abundant supply of fresh water for livestock and farm use.

Most of the association is in permanent pasture, for which it is best suited. Only a few farms are completely within the association. Most of them overlap into associations where smoother Chester soils can be used. The farms are mainly of the livestock type.

9. *Glenelg-Manor-Elioak*

This association consists of rolling, hilly and steep, micaceous soils over quartz sericite schist. It occurs on ridgetops and on eastern and western slopes of the Hogback and Catoctin Mountains. The larger areas are along the lower slopes of the Catoctin Mountain south of Point of Rocks, Md. The association comprises 7.8 square miles, or 1.5 percent of the total county area. The elevation above sea level ranges from 400 to 750 feet.

The Glenelg, Elioak, and Manor soils make up most of the association. There are small areas of Meadowville, Thurmont, Trego, and Worsham soils and Rocky land (acidic rock).

The natural drainage system is well developed. Runoff is medium to very rapid. Internal drainage is good, except in small alluvial areas in drainageways.

The Glenelg soils, which make up 50 percent of the association, are mostly on rolling, undulating, and hilly relief. They are well suited to crops, except on the hilly slopes. The Manor soils, next in extent, are best suited to pasture and forest, since they are mostly on hilly and steep relief. The Elioak soils, which occur on rolling and undulating relief, are well suited to most local crops.

The Manor soils are mostly in pasture. The Glenelg and Elioak soils are used mostly for crops and pasture.

Several fairly large livestock farms are in the association. There are many small subsistence farms, especially near Point of Rocks, as well as part-time farms. Most farms are not completely within the association, as the association areas are generally small, long, and narrow.

The woodlands are chiefly oak and poplar. Corn, small grain, and mixed hay, as well as some alfalfa and orchardgrass, are grown on the Glenelg and Elioak soils. Vegetables and ornamental shrubs do well, although fertility must be maintained. The hazard of erosion is high on the steeper, shallower Manor soils.

The association has a good supply of ground water, and springs are good. Wells are easily dug, and a good supply of water is reached at depths of less than 100 feet.

10. *Myersville-Catoctin-Fauquier*

This association consists of rolling, hilly, and steep soils of the upland ridges that overlie greenstone schist. It occurs in two areas along the Catoctin and Hogback Mountains in the central part of the county and near Silcott Springs. The association area covers 45.5 square miles, or 8.8 percent of the county area. The elevation above sea level ranges from 500 to 897 feet. Myersville, Catoctin, and Fauquier soils make up most of the acreage. Small areas of Rohrersville and Meadowville soils are scattered throughout the association. The underlying rock is mostly greenstone schist. Other rocks are chloritic schist and biotite gneiss. This association has a well-developed drainage system and occupies the higher elevations of the valley uplands.

The smoother rolling slopes of the Myersville and Fauquier soils are fairly fertile and produce most of the local crops. The shallow Catoctin soils and steeper slopes of other soils are well suited to pasture. More than half of the association acreage is best suited to pasture and forest.

Many beautiful homes and some good livestock and dairy farms are in this association.

The soils of this association are generally medium to strongly acid. The water supply is good. Springs, wells, and fresh-water streams are the main sources.

Soils on Sandstone and Shale of Piedmont Plateau

Sandstone and shale of Triassic age were parent materials for the principal soils of 10 associations that lie in the eastern part of the county.

11. *Bucks-Penn-Calverton*

This association consists of mostly deep, undulating and nearly level soils over red shale, sandstone, and sandstone conglomerate. It is located south of Leesburg and also north near the Potomac River. Its area is 6.7 square miles, or 1.3 percent of the county. The elevation above sea level ranges from 300 to 389 feet.

Most of the association is made up of the deep, well-drained Bucks silt loam, which is underlain mostly by sandstone conglomerate material. A small acreage of Croton and Manassas soils occurs in widely scattered areas. A small percentage of the association is poorly drained. Production is fair to good for most crops, except on the poorly drained areas of Croton and Calverton soils.

The water is supplied by wells. Most wells are less than 100 feet deep.

12. *Penn-Calverton-Croton*

This association consists of mostly shallow, red soils over shale, sandstone, and shaly sandstone. It is extensive and widely scattered throughout the Triassic Lowlands. It comprises 56.9 square miles, or 11 percent of the county. The elevation above sea level ranges from 220 to 360 feet. Relief is generally undulating and rolling. Hilly and steep areas occur near the more deeply dissected drainageways.

The Penn soils, which compose the major acreage, are well drained to excessively drained. Croton soils are poorly drained, and the Calverton soils are somewhat poorly drained to moderately well drained.

Most of the association is used for crops and pasture. Exceptions are some of the steeper slopes of the Penn soils and flat, wet Croton soils. Corn, small grain, and mixed hay are commonly grown on soils of this association. The Penn soils are well suited to small grain and grass, the Calverton to mixed hay, and the Croton to permanent pasture.

The soils of this association have low fertility. They are probably best suited to livestock and dairy farming. This association includes some of the larger farms of the county.

500057—60——2

The supply of water is not as good as in the Glenelg-Manor-Elioak association, but the soils are suitable for ponds. The drainage system is only fairly well developed. Most of the good water supply comes from dug wells, which are less than 100 feet deep in many places. There are few large creeks.

13. *Bucks (cobbly)-Penn (stony)-Calverton*

This association consists of mostly deep, undulating, stony and cobbly soils over shale, sandstone, and conglomerate with a thin overlay of stream terrace material. Most areas are in the south-central part of the county. The association covers 7.2 square miles, or 1.4 percent of the county. The elevation above sea level ranges from 295 to 400 feet.

Most of the acreage is in forest and permanent pasture —its most suitable uses. Cobbles and stones on the surface interfere with cultivation and need to be removed before the soils can be farmed. The water is supplied by wells, which are generally less than 100 feet deep.

14. *Iredell-Mecklenburg-Rocky land*

This association consists of stony, undulating and rolling, fine-textured clay soils over diabase and syenite. It comprises 25.9 square miles, or 5 percent of the county. The elevation above sea level ranges from 292 to 429 feet.

Most of the soils have a heavy clay subsoil and slow to moderately slow internal drainage. The association has a weakly developed drainage system, except where it is crossed by streams from other associations. Small areas of the poorly drained Elbert soils and the well-drained red Montalto soils occur throughout the association.

Generally, this association is well suited to pasture and hay crops, except alfalfa. The soils are fairly fertile, but they are hard to work because of the heavy clay subsoil. Several large dairy and livestock farms are in the association, but most of the acreage is farmed along with better soils of other associations.

The underlying rock is hard and resists weathering. The supply of ground water is limited. Wells are hard to dig and produce little water. The soil materials are excellent for building dams, however, and much runoff water can be held in ponds, since the internal drainage is slow.

15. *Legore-Montalto*

This association consists of shallow, brown and reddish-brown soils of the uplands over diabase and syenite. Its small scattered areas in the Piedmont Lowland cover 7.2 square miles, or 1.4 percent of the county. The elevation above sea level ranges from 250 to 418 feet. This association is on rolling and hilly areas, narrow undulating ridgetops, and some steep slopes near the larger drainageways.

Most of the association is composed of the shallow, stony, somewhat excessively drained Legore soils and the well-drained Montalto soils. Small areas of poorly drained Elbert soils and moderately well drained to well drained Meadowville soils also occur.

Most of this association is cleared and cultivated. Yields on many of the soils are limited by the degree of slope, shallowness of profile, and stoniness. The Legore soils are best suited to pasture, and the wet Elbert soils are best suited to forest and pasture. Except for the cobbly and stony types, the deep Montalto soils are suited to most local crops. The Meadowville soils are excellent for local crops. Both the Montalto and Meadowville soils are fertile, easy to work, and productive.

A few livestock farms are within the association. Most farms extend into other associations.

The supply of water is poor, and there are few streams and springs. Wells are hard to dig and supply little water.

16. *Kelly-Brecknock-Catlett*

This association consists of gently undulating to rolling, fine-textured, and gravelly soils of the uplands that overlie mixed diabase and baked shale on baked shale and sandstone. It occurs in the extreme southeastern part of the county and covers 5.7 square miles, or 1.1 percent of the county. The elevation above sea level ranges from 300 to 335 feet. The relief is dominantly very gently undulating. The drainage system is weakly developed.

About half of the acreage is cleared and used for crops and pasture. The Kelly soils, the most extensive, are well suited to permanent pasture and hay, except alfalfa. They have a claypan in the subsoil and are hard to work and to keep productive. The moderately well drained to well drained Brecknock soils are well suited to most local crops. The Catlett soils are shallow, droughty, and low in fertility; they are suited mainly to pasture, forest, small grain, and grass. Small areas of Croton, Calverton, and Elbert soils occur in the association area. These soils are well suited to permanent pasture and mixed hay crops, except alfalfa.

Livestock and dairy farms are the most common types in this association. Part-time farmers are increasing in number. Few farms are completely within the association; most farms extend into other associations.

The supply of water is fair to good. There are few springs. Wells are hard to dig, especially in the mixed shale and diabase.

17. *Brecknock-Catlett-Croton*

This association consists of grayish, mostly undulating and rolling soils over baked shale, sandstone, and shaly sandstone. It occurs in the southeastern part of the county and has an area of 11.4 square miles, or 2.2 percent of the county. The elevation above sea level ranges from 250 to 300 feet. Small areas near larger streams have hilly relief.

The stream pattern of the association is well developed. The moderately well drained to well drained Brecknock soils compose most of the association. There are minor areas of the shallow, excessively drained Catlett soils, the poorly drained Croton soils, and the moderately well drained Kelly soils with claypan. These soils are scattered throughout the association.

Except for some of the hilly Catlett and wet Croton soils, the association is mostly in crops and pasture. The Brecknock soils are well suited to most local crops, but they need complete fertilizer, lime, and organic matter to produce high yields. The shallow, droughty Catlett soils are best used for pasture and small grain. The Croton soils are best suited to permanent pasture, but they need to be drained in places.

Dairy and livestock farms are common. A few farms, operated by part-time farmers, are scattered throughout the association.

Water is supplied by creeks, wells, and a few springs. Wells are fairly easy to dig and furnish a good supply of water at depths of 60 to 200 feet.

18. *Catlett-Brecknock-Croton*

This association consists of mostly shallow, gravelly, grayish soils over baked shale and shaly sandstone. It is in the central part of the Piedmont Lowland and comprises 15 square miles, or 2.9 percent of the county. The elevation above sea level ranges from 250 to 473 feet. The relief is mostly rolling and hilly; some narrow undulating ridgetops occur.

The main drainage pattern is well developed. The Catlett soils are excessively drained, the Brecknock soils are moderately well drained to well drained, and the Croton soils are poorly drained. The soils of this association have developed mainly from weathered products of baked shale and shaly sandstone. Parts of the Croton soils have developed from local alluvium.

About one-third of the acreage is in cutover forest. The remaining acreage is about equally in crops, pasture, and idle areas. The gray, shallow, droughty, infertile Catlett soils are mostly on hilly and rolling relief and contain much gravel and many angular cobbles in places. The Catlett soils are suited to trees, pasture, and mixed hay. The gray, moderately deep to deep Brecknock soils are fairly well suited to well suited to most local crops. The low, flat, wet Croton soils are best suited to pasture and forest but need some drainage in places to produce good pastures. The trees are mostly hardwoods, with mixed scrub pine.

Farms are generally livestock or dairy types or are operated by part-time farmers. Production is low compared to that on farms on better soils.

The supply of water is ample in most seasons. Most of it comes from wells, which are generally less than 100 feet deep.

19. *Calverton-Readington-Croton*

This association consists of poorly, somewhat poorly, and moderately well drained soils over red shale and shaly sandstone. It is mainly in the extreme eastern part of the county. The total area is 14.5 square miles, or 2.8 percent of the county. The elevation above sea level ranges from 280 to 300 feet. Outstanding characteristics of this association are level to very gently undulating relief, a weakly developed stream pattern, slow runoff, and slow internal drainage.

Nearly all of the association is cleared and in crops and pasture. The Calverton soils are light colored, moderately deep, and somewhat poorly drained to moderately well drained. They are well suited to small grain, pasture, and mixed hay, except alfalfa. The shallow, moderately well drained to well drained Readington soils are suited to many crops, except alfalfa and some vegetables. The gray, flat, poorly drained Croton soils are best suited to pasture and forest.

Livestock, dairy, and general farms are common in this association. There are several large farms.

Water is supplied by wells, a few springs, farm ponds, and a few small streams. The most important source is wells; water is at depths of 60 to 150 feet.

20. *Penn-Penn (cobbly)-Bucks*

This association consists of mostly shallow and cobbly soils over red shale and shaly sandstone with a thin overlay of stream-terrace material. It occurs in the Piedmont Lowland near the Potomac River and its terrace lands. The association area comprises 5.7 square miles, or 1.1 percent of the county. The elevation above sea level ranges from 250 to 350 feet. Rounded river cobbles are common throughout.

This association is similar to the Bucks (cobbly)-Penn (stony)-Calverton association. It differs in having cobbly Penn types, instead of stony, and in having smaller acreages of Bucks soil and very little of the Calverton soil.

Most areas are cleared. Several large livestock and dairy farms are in the association.

Soils on Limestone of Piedmont Plateau

Limestone was the parent material for the soils of one association that lies on both sides of U.S. Highway 15 in and north of Leesburg.

21. *Athol-Emory*

This association is composed of fertile, undulating and rolling soils over limestone conglomerate. Some areas are rocky. It is north of Leesburg and comprises 12.4 square miles, or 2.4 percent of the county. The elevation above sea level ranges from 245 to 400 feet. Relief is mostly undulating, and limestone ledges outcrop in many places.

The Athol soils are well drained to somewhat excessively drained; the Emory soils are moderately well drained to well drained. The small areas of Melvin soils are poorly drained, and the small areas of Lindside soils are somewhat poorly drained to moderately well drained.

Athol gravelly silt loam contains small pieces of gravel that washed from adjacent mountains. Areas of Athol and Emory soils free of limestone ledges are fertile, highly productive of most local crops, and almost all in cultivation.

Some Rocky land is mostly in bluegrass and white-clover and produces some of the best pasture in the county. A scattered growth of walnut and locust trees is common on some of the more rocky areas where many rock ledges occur. These rocky areas have a low capacity to hold water that plants can use. Pastures are easily damaged by short periods of dry weather.

Large livestock and dairy farms are in this association. The soils contain more lime than soils of the other associations.

Soils on Colluvial or Alluvial Deposits

Soils on colluvial or alluvial deposits lie on foot slopes on bottom lands in all parts of the county. Seven associations of these soils are shown on the map.

22. *Dyke-Unison-Elbert*

This association consists of stony and cobbly, deep, fine-textured soils on old colluvium underlain principally by

basic rock. It occurs on undulating and rolling relief along the foot slopes of the Blue Ridge and the Catoctin Mountains. The area of the association is 8.3 square miles, or 1.6 percent of the county. The elevation above sea level ranges from 400 to 600 feet. Most of the area has developed from colluvium consisting mainly of greenstone materials.

The well drained Dyke soils and the well drained to moderately well drained Unison soils, both on the colluvial lands, occupy most of the association. They occur in higher positions. The poorly drained Elbert soils are on nearly level to gently undulating areas in depressions and along upper drainageways. This association also includes small acreages of Rohrersville soils of the colluvial lands and of the Chester, Myersville, Whiteford, and Hazel soils of the uplands.

From 50 to 60 percent of the association is in pasture, and about 6 percent is in forest. The rest is used intensively for crop production. Most of the farms are of the livestock or dairy type. There are a few small subsistence farms and a few farms operated by part-time farmers. Many farms in this association have acreages good for crops and pasture.

The Dyke and Unison soils are among the better agricultural soils of the county. The smoother, less stony parts are productive and easy to manage. The stonier and more rolling areas, along with the Elbert soils, are well suited to permanent pasture.

23. *Chewacla-Congaree-Wehadkee*

This association is composed of level to nearly level soils of the first bottoms—soils consisting of material washed from the Piedmont Upland. It is located mainly along Goose Creek and Little River. The area comprises 2.1 square miles, or 0.4 percent of the county. The elevation above sea level ranges from 250 to 300 feet. The soils of this association are subject to flooding. They have developed from material washed mostly from the Chester, Brandywine, Eubanks, Myersville, Catoctin, and associated soils.

Except for a few small areas of Meadowville silt loam, this association has nearly level to level relief, very slow to slow runoff, and very slow to moderate internal drainage. Most of the area consists of the somewhat poorly drained to moderately well drained Chewacla soils. Scattered throughout are the well-drained Congaree soils, the poorly drained Wehadkee soils, the poorly drained Worsham soils, and some Mixed alluvial land.

Most of the acreage is cleared and is chiefly in permanent pasture. Because of the danger of flooding, no homes are located in the association. The areas make up parts of farms that extend into associations in the uplands. Farms that are mostly in the Chewacla-Congaree-Wehadkee association are mainly of the livestock and dairy type.

Some of the most fertile soils in the county are in this association. The soils are new, and fresh deposits are laid down in many places after each flood.

The Congaree and Chewacla soils produce excellent corn and other row crops in normal seasons. The Wehadkee soils are suitable only for permanent pasture. Some pasture areas need to be drained for good production.

Erosion is not a hazard on soils of this association. The Chewacla and Wehadkee soils are difficult to work because of the wet condition.

The major streams of the county run through the area, and there are many springs. Few, if any, wells are dug.

24. *Braddock-Thurmont*

This association consists of deep, undulating to rolling soils over old colluvium consisting of mixed greenstone, schist, and quartzite materials. It occurs along the foot slopes of the Blue Ridge, Catoctin, and Hogback Mountains. The area is about 8.3 square miles, or 1.6 percent of the county. The elevation above sea level ranges from 240 to 600 feet.

The association consists mostly of the well drained Braddock and the moderately well drained to well drained Thurmont soils but includes small areas of Dyke, Trego, and Worsham soils. Most areas have angular cobbles and some stones on the surface and in the profile.

The smoother areas, which are free of stones, are well suited to most local crops and are generally cultivated. Most of the cobbly and strongly sloping areas are in pasture; a small part is still in forest. Several large livestock and dairy farms are partly in the association. Few of the soils need drainage.

The ground water in this area is good. It is deep, however, because of the thickness of the old colluvial beds that have been deposited over schist, granodiorite, and limestone materials.

25. *Rowland-Bowmansville-Bermudian*

This association consists of level to nearly level, poorly, somewhat poorly, and well drained soils. These soils are located on first bottoms consisting of material that originated chiefly from Triassic rocks. The association occurs mostly in the eastern part of the Piedmont Lowland. Its area is 2.6 square miles, or 0.5 percent of the county. The elevation above sea level ranges from 180 to 250 feet.

The entire area is subject to flooding. Runoff is slow. Except for the Bermudian, most of the soils have slow internal drainage. Most areas are in permanent pasture and are used in conjunction with soils of other associations.

26. *Hiwassee-Masada*

This association is made up of deep, well-developed soils on high stream terraces consisting of material washed from the Piedmont Upland. The association area, located near the Potomac River, covers 2.6 square miles, or 0.5 percent of the county. The elevation above sea level ranges from 300 feet to 420 feet—one of the highest elevations in the Piedmont Lowland. The relief is mostly undulating, but there are some sloping and hilly areas. Rounded cobbles are common throughout the soils in many places. Several gravel pits occur in the association.

About 75 percent of the area is cleared and in pasture and crops. These cleared areas, except for the more cobbly, are well suited to a wide variety of crops. Several large livestock and dairy farms are entirely or partly within the association. Many new homes have been built within the last few years on some of the highest elevations.

The supply of water is limited, except in wells. The wells probably need to be drilled deeper to penetrate the terrace materials and get into the underlying shale and sandstone.

27. *Captina-Robertsville-Elk*

This association is composed of gently undulating, poorly, somewhat poorly, and well drained soils on stream terraces consisting of material that originated chiefly from limestone. It occurs in scattered areas along the Potomac River. The total area is 5.7 square miles, or 1.1 percent of the county. The elevation above sea level ranges from 200 to 374 feet. The relief is mostly gently undulating but ranges from nearly level to sloping.

The Captina soils are the most extensive in the association, and they occur on both high and low terraces. These soils, which are characterized by a subsoil hardpan, are best suited to pasture and mixed hay, except alfalfa. The flat, poorly drained Robertsville soils on the lower terraces are best suited to forest or pasture. The inextensive, fertile, well drained to moderately well drained Elk soils on the low terraces are well suited to most local crops.

Nearly all of the acreage is cleared and in crops and pasture. Few, if any, farms are completely within the association. Several large livestock and dairy farms, however, include large parts of this association.

The supply of water is limited, except in wells.

28. *Huntington-Lindside-Melvin*

This association is composed of nearly level to level, poorly, somewhat poorly, and well drained soils of the first bottoms. These soils consist of material that originated chiefly from limestone. They are located along the Potomac River and are subject to frequent floods. The area of the association is 3.1 square miles, or 0.6 percent of the county. The elevation above sea level ranges from 180 to 200 feet. Runoff is slow. Internal drainage is medium in the Huntington soils, slow in the Lindside, and very slow in the Melvin.

Most areas are cleared and chiefly in permanent pasture, mixed hay, and corn. The Huntington soils are suitable for corn and many hay crops. The somewhat poorly drained to moderately well drained Lindside soils are well suited to mixed hay, except alfalfa. The poorly drained Melvin soils are best suited to pasture or forest.

The soils of this association are generally used along with those of other associations to complete the farm units.

Use and Management of Soils

This section has four parts. The first part is a discussion of the general principles of soil management. The second explains the system of land-capability grouping used. In the third part, all the soils of the county are placed in capability units and management suggestions for each unit are given. In the fourth part, productivity ratings of principal crops are given for each soil under two levels of management.

Principles of Soil Management

The general requirements for good soil management are discussed in the following paragraphs. The special requirements are discussed in the section Management by Capability Units.

A knowledge of the soil capabilities serves as a guide for estimating crop needs. Added to this should be knowledge of the past management of a given field, the feasible yield level, and the results of soil and plant tests and of experiments on test farms.

It often happens that parts of a field need more limestone or fertilizer than other parts. The soil map and soil tests together show these differences and make it possible to apply the proper amounts of lime and fertilizers where needed. Local professional workers will assist in soil tests.

Organic matter and fertilizer.—The removal of crops from the land year after year and the dissolving and leaching action of rainwater cause soils to become acid and deficient in plant nutrients. Satisfactory yields cannot be produced on such soils without adequate lime and fertilizer.

Most of the soils of Loudoun County are deficient in organic matter and nitrogen. Use of nitrogen fertilizers on all crops except legumes will improve yields and increase the amount of available organic matter that can be returned to the soil. The organic matter, in turn, improves the capacity of the soil to hold water that plants can use and reduces erosion. Nitrogen, unlike phosphorus and potassium, is not a constituent of the soil minerals. It comes largely from commercial fertilizer and plant remains, especially those of legumes. Manure will furnish considerable nitrogen and organic matter. The use of crop residues, manure, and nitrogen will depend largely on the type of crop produced.

Complete commercial fertilizers (those containing nitrogen, phosphate, and potash) are needed for small grain. Legumes should have mineral fertilizers (potash and phosphate) at the time of seeding and later as a topdressing. Additional nitrogen fertilizer should be used, especially on sandy soils, as a sidedressing for corn and as a topdressing for winter wheat and barley.

Crop rotations.—Good crop rotations will furnish organic matter to the crops that need it most. Legume residues or green-manure crops can be plowed under for corn. This practice will thus improve the yields of the crop having the highest acre value. Crop rotations also help to control erosion and soil-borne diseases. They distribute the drain of certain plant nutrients over a longer period. This distribution allows more time for the soil to furnish these elements through normal weathering processes.

In Loudoun County, a good rotation should include a legume crop, such as alfalfa, red clover, ladino clover, or lespedeza. The selection of the legume will depend upon the type of soil and its ability to produce.

Erosion control.—More than 70 percent of the county has been moderately damaged by sheet erosion and some shallow gullying. Little of the acreage is severely gullied. Better use and management is needed.

Under good management, the steeper areas are kept in forest or pasture and protected from fire and over-

grazing. Sloping areas should have crop rotations that will keep the soil covered most of the time; for example, corn, wheat, and 3 years of alfalfa.

If the fertility of a soil is raised to a high level and kept at that level, erosion is reduced. The increased plant growth adds to the organic-matter content of the soil, which improves soil structure and increases the rate of infiltration. Additional erosion control practices that may be needed include contour tillage, stripcropping, and sodding of drainageways.

Drainage.—Many imperfectly drained to poorly drained areas in Loudoun County have excellent potential for crops and pasture if they could be artificially drained. Many of the poorly drained bottom lands are now idle. The total acreage that needs drainage is somewhat small, however. The natural drainage of each mapping unit is mentioned in its description. Each unit will need to be studied to see if drainage is practical.

Crops growing on wet soils that cannot be tilled or ditched are more affected by unfavorable weather than those growing on soils that are permeable to water and roots. The adverse effect can be lessened by choosing crops that are more water tolerant and by proper use of fertilizer.

Good tillage practices.—Soils must be kept in good condition to produce good yields. Tillage often causes gradual deterioration of soil structure and loss of organic matter. This deterioration may not be noticed until the soil becomes very poor and hard to work. Certain soils must be cultivated within a narrow range of moisture content to prevent puddling. Organic matter and sod-forming crops will help to restore soil structure. The use of tillage implements that will incorporate organic matter into the surface horizon is beneficial.

Capability Groups of Soils

Capability grouping is a system of classification used to show the relative suitability of soils for crops, grazing, forestry, and wildlife. It is a practical grouping based on the needs and limitations of the soils, the risks of damage to them, and also on their response to management. There are three levels above the soil mapping unit in this grouping. They are the capability unit, subclass, and class.

The capability unit, which can also be called a management group of soils, is the lowest level of capability grouping. A capability unit is made up of soils that are similar in the kind of management they need, in the risk of damage, and in their general suitability for use.

The next broader grouping, the subclass, is used to indicate the dominant kind of limitation. The letter symbol "e" indicates that the main limiting factor is risk of erosion if the plant cover is not maintained; "w" means that uneven surface and the frequency of overflow make the soil unsuited to cultivation; "s" means that sandiness, shallowness, or a very slowly permeable subsoil makes the soil too droughty for any but native plants adapted to the condition. In some parts of the country there is another subclass, "c" for soils that are limited chiefly by a climate that is too dry or too cold.

The broadest grouping, the land capability class, is identified by Roman numerals. All the soils in one class have limitations and management problems of about the same degree, but of different kinds, as shown by the subclass. All the land classes except class I may have one or more subclasses.

Eight broad classes are provided in the national capability classification, although not all these classes are used in Loudoun County.

In classes I, II, and III are soils that are suitable for annual or periodic cultivation of annual or short-lived crops.

Class I soils are those that have the widest range of use and the least risk of damage. They are level, or nearly level, productive, well drained, and easy to work. They can be cultivated with almost no risk of erosion and will remain productive if managed with normal care.

Class II soils can be cultivated regularly, but they do not have quite so wide a range of suitability as class I soils. Some class II soils are gently sloping; consequently, they need moderate care to prevent erosion. Other soils in class II may be slightly droughty, or slightly wet, or somewhat limited in depth.

Class III soils can be cropped regularly but have a narrower range of use. These need even more careful management.

In class IV are soils that have greater natural limitations than those in class III, but they can be cultivated for some crops under very careful management.

In classes V, VI, and VII are soils that normally should not be cultivated for annual or short-lived crops, but they can be used for pasture or range, for woodland, or for wildlife.

Class V soils are nearly level and gently sloping but are droughty, wet, low in fertility, or otherwise unsuitable for cultivation.

Class VI soils are not suitable for crops because they are steep, or droughty, or otherwise limited, but they give fair yields of forage or forest products. Some soils in class VI can, without damage, be cultivated enough so that fruit trees or forest trees can be set out or pasture crops seeded.

Class VII soils provide only poor to fair yields of forage or forest products and have characteristics that limit them severely for these uses.

In class VIII are soils that have practically no agricultural use. Some of them have value as watersheds, wildlife habitats, or for scenery. There are no class VIII soils in Loudoun County, although small areas occur in some class VI and VII soils.

The capability classes, subclasses, and units in Loudoun County are given in the following list. The brief description of each subclass gives the general nature of most, but not all, of the soils included.

Class I.—Soils that are easy to farm and have few limitations that restrict their use.

Unit I–1: Nearly level fine sandy loam and silt loam soils on first bottom lands commonly subject to overflow.

Class II.—Soils that have some limitations, which reduce the choice of plants or require moderate conservation practices.

Subclass IIe: Mostly undulating soils subject to erosion.

Unit IIe-1: Undulating silt loam soils of the upland developed over limestone.
Unit IIe-2: Undulating, dominantly medium-textured soils of the upland.
Unit IIe-3: Nearly level to undulating loam soils on low stream terraces along the Potomac River.
Unit IIe-4: Undulating, medium-textured soils on old colluvium.
Subclass IIw: Soils moderately limited by excess water.
Unit IIw-1: Nearly level to very gently sloping, medium-textured soils on young local alluvium or recent colluvium.
Class III.—Soils that have severe limitations, which reduce the choice of plants or require special conservation practices, or both.
Subclass IIIe: Rolling and undulating soils.
Unit IIIe-1: Rolling gravelly silt loam soil of the upland developed over limestone.
Unit IIIe-2: Rolling, dominantly medium-textured soils of the upland.
Unit IIIe-3: Undulating and rolling silty clay loam soils with silty clay loam to clay subsoils that are moderately permeable.
Unit IIIe-4: Undulating, cobbly and gravelly silt loam soils of the upland.
Unit IIIe-5: Dominantly undulating loam and silt loam soils with moderately fine textured shallow subsoils.
Unit IIIe-6: Undulating to rolling loam soils on high stream terraces.
Unit IIIe-7: Undulating and rolling cobbly loams on high stream terraces.
Unit IIIe-8: Rolling and undulating, gravelly, stony, and cobbly, medium-textured soils on old colluvium.
Subclass IIIw: Nearly level or undulating soils limited by a pan, poor drainage, or frequent overflow.
Unit IIIw-1: Undulating, medium-textured soils with a restricted root zone.
Unit IIIw-2: Nearly level silt loam soils on first bottoms subject to overflow.
Subclass IIIs: Stony, undulating to rolling, well-drained soils of the upland.
Unit IIIs-1: Stony upland soils.
Class IV.—Soils that have very severe limitations that restrict the choice of plants, or require very careful management, or both.
Subclass IVe: Undulating to rolling shallow soils.
Unit IVe-1: Undulating to rolling soils with firm to extremely firm clay subsoils at 13 to 20 inches.
Unit IVe-2: Rolling, friable soils of the upland, which are shallow to bedrock.
Subclass IVw: Nearly level to undulating soils with plastic clay subsoils.
Unit IVw-1: Nearly level to undulating soils with plastic clay subsoils.
Subclass IVs: Cobbly or stony soils.
Unit IVs-1: Friable, stony, undulating and rolling soils that are shallow to basic bedrock.
Unit IVs-2: Friable, rolling soils that are shallow to shaly bedrock.
Unit IVs-3: Cobbly and stony soils, dominantly rolling, with permeable sandy clay loam to silty clay loam subsoils.
Class V.—Soils with little or no erosion hazard but with other limitations that make them unsuited to cultivation.
Subclass Vw: Wet, nearly level soils on first bottoms.
Unit Vw-1: Wet, nearly level, permeable, deep soils on first bottoms.
Class VI.—Soils with severe limitations that make them generally unsuited to cultivation and that restrict their use largely to pasture or forest.
Subclass VIe: Soils that will erode rapidly if not protected.
Unit VIe-1: Hilly, moderately deep or deep, permeable soils.
Unit VIe-2: Hilly and steep, friable soils of the upland, shallow to bedrock.
Subclass VIs: Undulating and rolling to steep soils with rock outcrops and loose stones.
Unit VIs-1: Undulating and rolling soils with firm silty clay subsoils and many limestone outcrops.
Unit VIs-2: Stony, rolling to steep soils with permeable, moderately firm textured subsoils.
Unit VIs-3: Stony, shallow, rolling soils with friable subsoils.
Unit VIs-4: Stony, shallow, hilly soils with friable, permeable subsoils.
Unit VIs-5: Undulating and rolling, stony, very shallow soils.
Class VII.—Soils with very severe limitations that restrict their use to pasture or trees.
Subclass VIIe: Hilly, steep, and eroded soils.
Unit VIIe-1: Hilly and severely eroded, rolling soils with moderately permeable silty clay loam subsoils.
Unit VIIe-2: Excessively drained, hilly and steep, shaly or stony soils that are very shallow to shaly rock.
Unit VIIe-3: Very stony and rocky soils.
Subclass VIIs: Stony, rolling and steep soils, shallow to bedrock.
Unit VIIs-1: Stony, steep soils, shallow to bedrock.
Unit VIIs-2: Rocky and stony soils.

Management by Capability Units

The capability units are briefly discussed in this section and the suitable crops, cropping systems, and supplementary practices for each unit are given in table 2.

Capability unit I–1

This unit consists of nearly level fine sandy loam and silt loam soils on first bottom lands commonly subject to overflow. These soils have friable and permeable subsoils. Depth to bedrock or other material unfavorable to plant

roots ranges from 4 to 10 feet. Moisture conditions are favorable, the soils are well drained, and erosion from runoff is no hazard. The capacity to hold water that plants can use is high. The fertility and the amount of organic matter are medium to high. The reaction ranges from neutral to strongly acid.

These soils are suitable for a moderately wide variety of crops. However, flooding and the large amount of

TABLE 2.—*Suitable crops, cropping*

Capability unit and soil	Suitable uses	Rotations or cropping systems	Lime requirements per acre to maintain pH of 6.0 to 6.5 for common crops and pH of 6.5 to 7.2 for alfalfa [3]
Unit I–1 Bermudian silt loam. Congaree silt loam. Congaree fine sandy loam. Huntington silt loam.	Corn, red clover and white clover,[4] and other clovers, lespedeza, orchardgrass, timothy and fescue, soybeans, cowpeas, and some vegetables.	Corn, clover. Corn, corn, small grain, clover. Corn, small grain, clover, clover and grass.	1 to 2 tons every 4 or 5 years. Huntington generally does not need lime.
Unit IIe–1 Athol silt loam, undulating phase. Athol gravelly silt loam, undulating phase.	Corn, small grain, soybeans, cowpeas, alfalfa, lespedeza, red clover, white clover, orchardgrass, fescue, and pasture mixture.	Corn, small grain with clover or lespedeza. Corn, small grain with clover, clover. Corn, small grain with clover, 2 years of clover-and-grass meadow. Corn, small grain with clover, 2 years of clover-and-grass meadow, orchardgrass. Corn, small grain with clover, ladino clover, 3 years orchardgrass. Continuous alfalfa.	Common crops: 1 to 1½ tons every 3 to 5 years. Alfalfa: 2 tons every 3 to 5 years.
Unit IIe–2 Bucks silt loam, undulating phase. Chester loam, undulating phase. Chester silt loam, undulating phase. Chester loam and silt loam, undulating phases. Chester-Brandywine loams and sandy loams, undulating phases. Dyke cobbly silty clay loam, undulating phase. Elioak silt loam, undulating phase. Eubanks-Chester loams and silt loams, undulating phases. Fauquier silt loam, undulating phase. Glenelg silt loam, undulating phase. Montalto silt loam, undulating shallow phase. Myersville silt loam, undulating phase. Whiteford silt loam, undulating phase. Wickham loam.	All crops, including many vegetable and truck crops.	Corn, small grain with clover or lespedeza. Corn, small grain with clover, clover. Corn, small grain with clover, 2 years of clover-and-grass meadow. Corn, small grain with clover, 2 years of clover-and-grass meadow, orchardgrass. Corn, small grain with clover, ladino clover, 3 years of orchardgrass. Continuous alfalfa.	Common crops: 1 to 1½ tons every 3 to 5 years. Alfalfa: 1½ to 2 tons every 3 to 5 years. Elioak, Glenelg, and Whiteford soils need more.
Unit IIe–3 Elk loam. Sequatchie loam.	All crops common to the area; better for corn than for small grain.	Corn, small grain, clover. Corn, small grain, clover-and-grass hay. Corn, corn, small grain, 2 years of clover-and-grass hay. Corn, corn, 4 years of alfalfa.	Common crops: 1 to 2 tons every 4 or 5 years.
Unit IIe–4 Braddock gravelly loam, undulating phase. Thurmont gravelly loam, undulating phase. Unison silt loam, undulating phase.	Corn, small grain, clover, lespedeza, alfalfa, orchardgrass, fescue, timothy, cowpeas, soybeans, and vegetables.	Corn, small grain, clover. Corn, small grain, 2 years of clover-and-grass hay. Corn, small grain, 3 years of clover-and-grass hay. Corn, 4 years alfalfa.	Common crops: 1 to 2 tons every 3 to 5 years. Alfalfa: 2 to 2½ tons every 3 to 5 years.

See footnotes at end of table.

moisture in the bottom lands make them unfavorable for some crops. Such crops are fall-planted small grain, alfalfa, and long-season cash crops that are damaged by overflow.

The soils in this unit are—

Bermudian silt loam.
Congaree silt loam.
Congaree fine sandy loam.
Huntington silt loam.

systems, and supplementary practices [1]

General fertilizer requirements for rotations [2]	Suitable tillage practices	Supplementary measures for water control [3]	Suitable liming and fertilizer practices to establish and maintain permanent pasture [2]
Moderate nitrogen, phosphate, and potash for corn and grass. Moderate phosphate and potash for legumes.	Deep plowing, shallow cultivation, and firm seedbed.	None needed	0 to 1½ tons of lime every 3 to 4 years; moderate to light applications of phosphate and potash. Use nitrogen when deficiency is evident.
Complete fertilizer, but chiefly phosphate and potash. Little or no nitrogen needed with manure or legumes. Complete fertilizer needed chiefly on corn, small grain, and grass.	Deep and early plowing, shallow cultivation, and firm seedbed.	Contour cultivation on the more sloping parts.	1 to 1½ tons of lime every 4 to 6 years. Use moderate nitrogen, phosphate, and potash (or manure and phosphate and potash) to establish. Then use phosphate and potash (or manure and phosphate) every 3 or 4 years thereafter.
Complete fertilizer but chiefly phosphate and potash. Little or no nitrogen needed with manure or legumes. Complete fertilizer needed chiefly on corn, small grain, and grass.	Deep plowing, shallow cultivation, and firm seedbed. Plow in organic matter as crop residue. Early plowing is not as essential as for unit IIe–1.	Contour cultivation on the more sloping parts.	1 to 2 tons of lime every 3 to 5 years. Fertilization same as for unit IIe–1.
Complete fertilizer but chiefly phosphate and potash. Little or no nitrogen is needed with manure or legumes. Nitrogen is needed chiefly on corn, small grain, and grass.	Deep plowing, shallow cultivation, and firm seedbed. Tillage is feasible under a wide range of moisture conditions.	None needed	1 to 2 tons of lime every 3 or 4 years. Use moderate applications of nitrogen, phosphate, and potash; manure and phosphate; or phosphate and potash to establish. To maintain pasture, use phosphate and potash (or phosphate with manure) every 3 or 4 years.
Complete fertilizer, chiefly phosphate and potash. Little or no nitrogen is needed with manure or legumes. Complete fertilizer is needed chiefly on corn, small grain, and grass.	Deep and early plowing, shallow cultivation, and firm seedbed.	Contour cultivation on the more sloping parts.	1 to 2 tons of lime every 3 to 4years. Use fairly heavy applications of nitrogen, phosphate, and potash, or of manure and phosphate, or of phosphate and potash to establish. Then use phosphate and potash (or manure and phosphate or manure and phosphate and potash) every 3 to 4 years.

TABLE 2.—*Suitable crops, cropping systems,*

Capability unit and soil	Suitable uses	Rotations or cropping systems	Lime requirements per acre to maintain pH of 6.0 to 6.5 for common crops and pH of 6.5 to 7.2 for alfalfa [3]
Unit IIw–1 Emory silt loam. Manassas silt loam. Meadowville loam. Meadowville silt loam. Meadowville silt loam, cobbly variant.	Corn, small grain, red and white clovers, lespedeza, orchardgrass, fescue, timothy, cowpeas, soybeans, and many vegetables.	Corn, small grain, clover. Corn, small grain, 2 years of clover-and-grass hay. Corn, corn, small grain, clover. Continuous gardening.	1 to 2 tons every 3 to 4 years. Manassas has the highest lime requirement, Emory the least.
Unit IIIe–1 Athol gravelly silt loam, rolling phase.	Corn, small grain, soybeans, cowpeas, alfalfa, lespedeza, red clover, white clover, orchardgrass, fescue, and pasture.	Corn, small grain, 2 years of clover and grass. Small grain, 3 or 4 years of clover-and-grass hay. Continuous alfalfa, reseeded as the stand requires.	Common crops: 1 to 1½ tons every 3 to 5 years. Alfalfa: 2 tons every 3 to 5 years.
Unit IIIe–2 Chester loam and silt loam, rolling phases. Chester-Brandywine loams and sandy loams, rolling phases. Elioak silt loam, rolling phase. Eubanks-Chester loams and silt loams, rolling phases. Fauquier silt loam, rolling phase. Glenelg silt loam, rolling phase. Myersville silt loam, rolling phase. Whiteford silt loam, rolling phase.	All crops, including many truck crops.	Long rotations with corn or other row crops only once in 5 to 7 years, or shorter rotations of small grain and hay.	Same as for unit IIe–2
Unit IIIe–3 Dyke cobbly silty clay loam, eroded rolling phase. Fauquier silty clay loam: Eroded undulating phase. Eroded rolling phase.	Alfalfa, clover, lespedeza, orchardgrass, and other pasture plants.	Continuous alfalfa. Corn, small grain, 3 years of clover and grass. Corn, small grain, 3 to 5 years alfalfa.	Common crops: 2 tons every 5 years. Alfalfa: 2 to 3 tons every 5 years.
Unit IIIe–4 Brecknock gravelly silt loam, undulating phase. Bucks cobbly silt loam, undulating phase.	Corn, small grain, red and white clovers, alfalfa, lespedeza, orchardgrass, timothy, fescue, soybeans, and cowpeas.	Corn, small grain, clover Corn, small grain, 2 years of clover-and-grass hay.	Common crops: 2 tons every 3 to 5 years. Alfalfa: 2 to 3 tons every 4 to 5 years.
Unit IIIe–5 Brecknock gravelly silt loam, rolling phase. Catlett gravelly silt loam, undulating phase. Penn cobbly silt loam, undulating phase. Penn loam, undulating phase. Penn shaly silt loam, eroded undulating phase. Penn silt loam: Undulating phase. Eroded undulating phase.	Corn, small grain, red clover, lespedeza, soybeans, cowpeas, and several kinds of pasture grasses.	Corn, small grain, clover Corn, small grain, 2 to 3 years of clover-and-grass hay. Corn, 3 to 4 years of alfalfa and grass hay. Corn and soybeans or cowpeas, small grain, 2 years of clover-and-grass meadow.	Common crops: 2 tons every 3 to 5 years. Alfalfa: 2 to 3 tons every 4 to 5 years.
Unit IIIe–6 Hiwassee loam, undulating light surface variant. Masada loam, undulating phase.	All crops common to the area.	Corn, small grain, clover Corn, small grain, 2 or 3 years of clover-and-grass meadow. Corn, 4 years of alfalfa.	Common crops: 1 to 2 tons every 3 to 4 years.

See footnotes at end of table.

and supplementary practices [1]—Continued

General fertilizer requirements for rotations [2]	Suitable tillage practices	Supplementary measures for water control [3]	Suitable liming and fertilizer practices to establish and maintain permanent pasture [2]
Moderate application of complete fertilizer when manure or legumes are not used. No nitrogen needed where manure or legumes are used. Little nitrogen is ordinarily needed in good rotations.	Deep plowing, shallow cultivation, and firm seedbed.	None needed	1 to 2 tons of lime every 3 to 5 years. Use fairly heavy applications of nitrogen, phosphate, and potash or of manure and phosphate and potash to establish. To maintain, use phosphate and potash (or manure and phosphate and potash) every 3 or 4 years. Little nitrogen is needed for maintenance.
Same as for unit IIe–1	Deep and early plowing, shallow cultivation, and fine seedbed.	None needed	1 to 1½ tons of lime every 4 to 6 years. Use moderate applications of nitrogen, phosphate, and potash (or manure and phosphate and potash) to establish. Use phosphate and potash (or manure and phosphate) every 3 or 4 years thereafter.
Same as for unit IIe–2	Same as for unit IIe–2, except that heavy seeding and improvement of infiltration and water-holding capacity are more essential.	None needed	Liming requirement same as for unit IIe–2, except that heavier applications are needed. See IIe–1 for fertilizer needs.
Great need for increasing organic matter. Complete fertilizer required, except that nitrogen may be reduced or omitted when legumes are turned under.	Very early and deep plowing and shallow cultivation; avoid tillage when the soil is too wet.	None needed	2 tons of lime every 5 to 6 years. Use moderately heavy applications of nitrogen, phosphate, and potash (or manure and phosphate and potash) to establish. To maintain, use phosphate and potash every 3 or 4 years. The soils of this unit respond well to manure.
Same as for unit IIe–1	Very early and deep plowing and shallow cultivation.	None needed	1½ to 2 tons of lime every 4 or 5 years. Use heavy applications of nitrogen, phosphate, and potash (or manure and phosphate and potash) to establish. Use similar treatment every 3 to 4 years to maintain.
Heavy application of complete fertilizer. Organic matter is especially needed. Where manure is applied less nitrogen fertilizer is needed.	Deep and early plowing, shallow cultivation, and firm seedbed.	Too shallow for terraces to be practical. Stripcropping is useful on more sloping parts.	2 tons of lime every 3 to 5 years. Use heavy applications of nitrogen, phosphate, and potash (or manure and phosphate and potash) to establish. To maintain, use similar treatment every 3 to 5 years.
Same as for unit IIe–3	Deep plowing, shallow cultivation, and firm seedbed. Tillage is feasible under wide range of moisture conditions.	Stripcropping and contour cultivation.	1 to 2 tons every 3 to 4 years. Use moderate applications of nitrogen, phosphate, and potash (or manure and phosphate or manure and phosphate and potash) to establish. To maintain, use phosphate and potash (or manure and phosphate) every 3 or 4 years.

TABLE 2.—*Suitable crops, cropping systems,*

Capability unit and soil	Suitable uses	Rotations or cropping systems	Lime requirements per acre to maintain pH of 6.0 to 6.5 for common crops and pH of 6.5 to 7.2 for alfalfa [3]
Unit IIIe–7 Hiwassee cobbly loam: Undulating light surface variant. Rolling light surface variant. Masada cobbly loam, undulating phase.	All crops common to the area, including most vegetables. Cobbles in these soils make them less suitable than the soils of unit IIIe–6.	Long rotations consisting chiefly of perennial hay and pasture crops.	Common crops: 1 to 2 tons every 3 to 4 years.
Unit IIIe–8 Braddock cobbly loam, undulating phase. Braddock gravelly loam, rolling phase. Thurmont cobbly loam, undulating phase. Thurmont gravelly loam, rolling phase. Unison silt loam, rolling phase. Unison stony silt loam, undulating phase.	Corn, small grain, clover, lespedeza, alfalfa, orchardgrass, fescue, timothy, cowpeas, soybeans, and vegetables.	Small grain, 2 to 3 years of clover-and-grass hay. Corn, small grain, 3 to 4 years of clover-and-grass hay. Corn, 5 years of alfalfa.	Common crops: 1 to 2 tons every 3 to 5 years. Alfalfa: 2 to 3 tons every 3 to 5 years.
Unit IIIw–1 Belvoir loam. Calverton silt loam, undulating phase. Captina silt loam. Captina silt loam, high terrace phase. Readington silt loam, undulating phase. Trego gravelly silt loam.	Corn, small grain, clover, lespedeza, grasses, cowpeas, soybeans. Alsike is better than red clover, and fescue is better than orchardgrass.	Corn, small grain, clover-and-grass or lespedeza hay. Corn and soybeans, small grain, 2 or 3 years of clover-and-grass hay. Corn, 3 years of clover-and-grass hay.	Common crops: 1½ to 2 tons every 3 to 4 years.
Unit IIIw–2 Chewacla silt loam. Lindside silt loam. Rowland silt loam.	Corn, soybeans, cowpeas, alsike clover, white clover, lespedeza, fescue, timothy.	Corn, 2 years of clover-and-grass hay. Corn, corn with soybeans.	Common crops: up to 2 tons every 3 to 4 years.
Unit IIIs–1 Eubanks-Chester stony loams and silt loams, undulating phases. Eubanks-Chester stony loams and silt loams, rolling phases. Fauquier stony silt loam, rolling phase. Myersville stony silt loam, undulating phase. Myersville stony silt loam, rolling phase.	All crops, including many truck crops, but stones interfere with cultivation.	For the more sloping soils, use long rotations with corn or other row crops once every 5 to 7 years; or use shorter rotations of small grain and hay. For the less sloping soils, same as for unit IIe–2.	Common crops: 1 to 1½ tons every 3 to 5 years. Alfalfa: 1½ to 2 tons every 3 to 5 years.
Unit IVe–1 Iredell-Mecklenburg silt loams: Undulating phases. Eroded undulating phases. Rolling phases. Eroded rolling phases. Kelly silt loam, undulating phase.	Corn, small grain, lespedeza, red clover, white clover, fescue, orchardgrass, soybeans.	Corn, small grain, clover. Small grain, 2 or 3 years of clover and grass. Corn, small grain, 2 to 4 years clover-and-grass meadow.	Common crops: 1 to 2 tons every 4 or 5 years.
Unit IVe–2 Brandywine loam and silt loam, rolling phases. Brandywine sandy loam, rolling phase. Catoctin silt loam, rolling phase. Hazel silt loam, rolling phase. Legore silt loam: Undulating shallow phase. Rolling shallow phase. Manor silt loam, rolling phase.	Corn, small grain, red clover, white clover, fescue, orchardgrass, soybeans, cowpeas and some truck crops.	Corn, small grain, clover. Corn, small grain, 2 or 3 years of clover and grass. Small grain, 4 years of clover-and-grass meadow. Corn, small grains, 4 years of clover-and-grass meadow.	Common crops: 1 to 2 tons every 4 or 5 years.
Unit IVw–1 Calverton silt loam, level phase. Croton silt loam: Level phase. Undulating phase. Elbert silt loam: Level phase. Undulating phase.	Bluegrass, fescue, whiteclover, corn, soybeans, and hay crops when adequately drained.	Undrained areas not well suited to rotations. Adequately drained areas: 1 or 2 years of corn or soybeans, 2 or more years of clover-and-grass meadow or pasture.	1 to 2 tons every 3 or 4 years.

See footnotes at end of table.

and supplementary practices [1]—Continued

General fertilizer requirements for rotations [2]	Suitable tillage practices	Supplementary measures for water control [3]	Suitable liming and fertilizer practices to establish and maintain permanent pasture [2]
Same as for unit IIe–3	Deep plowing, shallow cultivation, and firm seedbed. Removal of cobbles is feasible in some areas.	Stripcropping and contour cultivation.	1 to 2 tons of lime every 3 to 4 years. Use moderate applications of nitrogen, phosphate, and potash (or manure and phosphate or manure and phosphate and potash) to establish. To maintain, use phosphate and potash (or phosphate and manure) every 3 or 4 years.
Complete fertilizer, chiefly phosphate and potash. Little or no nitrogen is needed with manure or legumes. Complete fertilizer needed chiefly on corn, small grain, and grass.	Deep and early plowing and shallow cultivation.	Contour cultivation and stripcropping for short rotations.	1 to 2 tons of lime every 3 to 4 years. Use heavy applications of nitrogen, phosphate, and potash (or manure and phosphate and pottash) to establish. To maintain, use phosphate and potash (or manure and phosphate and potash) every 3 to 4 years.
Complete fertilizer, chiefly phosphate and potash. Little or no nitrogen needed with manure or legumes. Complete fertilizer needed chiefly on corn, small grain, and grass.	Deep plowing, shallow cultivation, and somewhat heavier than normal seedings. Periods when moisture conditions are favorable for tillage are somewhat restricted.	Drainage needed in places	1½ to 2 tons of lime every 3 or 4 years; use somewhat more on Calverton and Readington soils. Fertilization is about the same as for unit IIIe–8.
Moderate applications of phosphate and potash. Nonlegume crops need nitrogen also where manure is not used.	Deep plowing, shallow cultivation, and firm seedbed.	Some response to drainage can be expected.	Use up to 1½ tons of lime every 3 to 4 years. Use light to moderate applications of phosphate and potash.
Same as for unit IIe–1	Deep and early plowing, shallow cultivation, and firm seedbed. Remove stones where practical.	Stripcropping and contour cultivation needed on more sloping parts.	Use 1 to 1½ tons of lime every 4 to 6 years. Use moderate applications of nitrogen, phosphate, and potash (or manure and phosphate and potash) to establish; thereafter, phosphate and potash (or manure and phosphate) every 3 or 4 years.
Organic matter is badly needed, especially on eroded areas. Moderately heavy applications of complete fertilizer; or use manure or legumes with phosphate and potash.	Deep and very early plowing and shallow cultivation. Till only under most favorable moisture conditions.	Contour cultivation needed	1 to 2 tons of lime every 4 to 6 years. Complete fertilizer; manure on severely eroded areas.
Organic matter is badly needed, especially on eroded areas. Moderately heavy to heavy applications of complete fertilizer; or use manure or legumes with phosphate and potash. More nitrogen is needed on the sandier soils.	Fairly deep plowing, shallow cultivation, and firm seedbed. Remove stones. These soils can be tilled within a wide moisture range; suitable for seedbed preparation directly before planting.	Stripcropping needed	1 to 2 tons of lime every 3 to 5 years. Use heavy applications of complete fertilizer (or manure and phosphate and potash). Organic matter is needed.
Moderately heavy to heavy applications of complete fertilizer.	Fine texture and general wetness limit periods during which tillage is practical.	Drainage can be improved on most acreage by ditching; tile drainage is not practical on some acreage.	1 to 2 tons of lime every 3 to 4 years. To establish, use moderate to heavy applications of complete fertilizer (or manure and phosphate or manure and phosphate and potash). Repeat every 3 or 4 years.

TABLE 2.—*Suitable crops, cropping systems,*

Capability unit and soil	Suitable uses	Rotations or cropping systems	Lime requirements per acre to maintain pH of 6.0 to 6.5 for common crops and pH of 6.5 to 7.2 for alfalfa [3]
Unit IVw–1—Continued Elbert stony silt loam, colluvial phase. Kelly silt loam, level phase. Rohrersville silt loam. Rohrersville stony silt loam. Worsham silt loam.			
Unit IVs–1 Brandywine stony loam, rolling phase. Brandywine stony sandy loam, undulating phase. Legore stony silt loam, undulating shallow phase. Montalto stony silt loam: Undulating shallow phase. Rolling shallow phase.	Corn, small grain, red clover, white clover, fescue, orchardgrass, soybeans, cowpeas, and some truck crops.	Corn, small grain, clover. Corn, small grain, 2 or 3 years of clover and grass. Small grain, 4 years of clover-and-grass meadow. Corn, small grain, 4 years of clover-and-grass meadow.	Common crops: 1 to 2 tons every 4 or 5 years.
Unit IVs–2 Bucks cobbly silt loam, rolling phase. Catlett gravelly silt loam, rolling phase. Penn loam, rolling phase. Penn silt loam, rolling phase.	Chiefly permanent pasture legumes and grasses, fescue, orchardgrass, lespedeza, whiteclover.	Not generally recommended	For common crops: 1 to 2 tons every 4 or 5 years.
Unit IVs–3 Airmont stony loam: Undulating phase. Rolling phase. Braddock cobbly loam, rolling phase. Thurmont cobbly loam, rolling phase. Unison stony silt loam, rolling phase.	Chiefly permanent pasture legumes and grasses. The smoother, less stony areas are suited to small grain, corn, and hay.	Not generally recommended	For common crops: 1 to 2 tons every 4 or 5 years.
Unit Vw–1 Bowmansville silt loam. Melvin silt loam. Mixed alluvial land. Robertsville silt loam. Wehadkee silt loam.	Grain and most legumes for permanent pasture. Whiteclover and fescue mixture is well suited. When adequately drained, corn, soybeans, hay crops.	Drained areas: 1 to 2 years of corn or soybeans, 2 or more years of meadow or pasture.	Some soils, as Melvin, need little or no lime. Others need up to 2 tons every 3 or 4 years.
Unit VIe–1 Elioak silt loam, hilly phase. Fauquier silt loam, hilly phase. Glenelg silt loam, hilly phase. Myersville silt loam: Hilly phase. Eroded hilly phase. Whiteford silt loam, hilly shallow phase.	All legumes and grasses that are suited to pasture. Small grain, alfalfa, and other hay crops are suited to less sloping parts.	Small grain, 6 years of legume-and-grass meadow or pasture.	1 to 1½ tons every 3 to 5 years; 2 tons of alfalfa.
Unit VIe–2 Brandywine loam and silt loam: Hilly phases. Eroded hilly phases. Steep phases. Brandywine sandy loam: Hilly phase. Steep phase. Catoctin silt loam: Hilly phase. Eroded hilly phase. Steep phase. Hazel silt loam: Hilly phase. Steep phase. Legore silt loam, hilly shallow phase. Manor silt loam, hilly phase.	Most perennial legumes and grasses that are suited to pasture; lespedeza.	Not well suited to cultivation	1 to 1½ tons every 3 to 5 years; 2 tons for alfalfa.
Unit VIs–1 Athol rocky silt loam: Undulating phase. Rolling phase.	All perennial legumes and grasses for pasture.	Not well suited to cultivation	1 to 1½ tons every 3 to 5 years; 2 tons for alfalfa.

See footnotes at end of table.

and supplementary practices [1]—Continued

General fertilizer requirements for rotations [2]	Suitable tillage practices	Supplementary measures for water control [3]	Suitable liming and fertilizer practices to establish and maintain permanent pasture [2]
Organic matter badly needed, especially on eroded areas. Moderately heavy to heavy applications of complete fertilizer; or manure or legumes, with phosphate and potash. More nitrogen needed in the sandier soils.	Fairly deep plowing, shallow cultivation, and firm seedbed. Remove stones. These soils can be tilled within a wide moisture range; suitable for seedbed preparation directly before planting.	Stripcropping needed	1 to 2 tons of lime every 3 to 5 years. Use heavy applications of complete fertilizer (or manure and phosphate and potash). Organic matter is needed.
Organic matter is badly needed, especially on eroded areas. Use moderately heavy to heavy applications of complete fertilizer; or manure or legumes with phosphate and potash. More nitrogen is needed in the sandier soils.	Fairly deep plowing, shallow cultivation, and firm seedbed. Remove stones. These soils can be tilled within a wide moisture range; suitable for seedbed preparation directly before planting.	Stripcropping needed, but soils are too shallow for terracing.	1½ to 2 tons of lime every 3 to 4 years. Use heavy applications of complete fertilizer (or manure and phosphate or manure and phosphate and potash) to establish. Repeat every 3 or 4 years.
Organic matter is badly needed, especially on eroded areas. Use moderately heavy to heavy applications of complete fertilizer; or manure or legumes with phosphate and potash. More nitrogen is needed in the sandier soils.	Fairly deep plowing, shallow cultivation, and firm seedbed. Remove stones. These soils can be tilled within a wide moisture range; suitable for seedbed preparation directly before planting.	Stripcropping and contour cultivation if cultivated; generally poorly suited to cultivation.	1 to 2 tons every 3 to 4 years. Use moderate to heavy applications of complete fertilizer (or manure and phosphate or manure and phosphate and potash) to establish. Repeat every 3 or 4 years.
Moderate applications, especially of phosphate and potash. Organic matter is especially needed for Robertsville soil.	Fine texture and general wetness limit periods during which tillage is practical.	Drainage can be improved; tile drainage is practical, generally, except for some areas of Robertsville soil.	Some soils, such as Melvin, need little or no lime; others need up to 2 tons. Use light to moderate applications of phosphate and potash. Robertsville soil has the greatest need for lime and plant nutrients.
Complete fertilizer but chiefly phosphate and potash. Little or no nitrogen is needed with manure or legumes.	Deep and early plowing, shallow cultivation, and firm seedbed.	Stripcropping and contour tillage on areas needed for cultivation.	1 to 2 tons of lime every 3 to 4 years. Use heavy applications of complete fertilizer (or manure and phosphate or manure and phosphate and potash) every 3 or 4 years.
Use complete fertilizer but chiefly phosphate and potash. Little or no nitrogen is needed with manure or legumes.	Deep and early plowing, shallow cultivation, and firm seedbed.	Stripcropping and contour tillage on areas needed for cultivation.	1 to 2 tons of lime every 3 to 4 years. Use heavy applications of complete fertilizer (or manure and phosphate or manure and phosphate and potash) every 3 to 5 years.
Use complete fertilizer but chiefly phosphate and potash. Little or no nitrogen is needed with manure or legumes.	Deep and early plowing, shallow cultivation, and firm seedbed.	Stripcropping and contour tillage on areas needed for cultivation.	0 to 1 ton of lime every 3 to 4 years; phosphate and potash are needed mostly.

TABLE 2.—*Suitable crops, cropping systems,*

Capability unit and soil	Suitable uses	Rotations or cropping systems	Lime requirements per acre to maintain pH of 6.0 to 6.5 for common crops and pH of 6.5 to 7.2 for alfalfa [2]
Unit VIs–2 Eubanks-Chester stony loams and silt loams, hilly phases. Fauquier stony silt loam, hilly phase. Myersville stony silt loam: Steep phase. Eroded steep phase. Whiteford stony silt loam: Rolling phase. Hilly phase.	All perennial legumes and grasses for pasture.	Not well suited to cultivation	1 to 1½ tons every 3 to 5 years; alfalfa, 2 tons.
Unit VIs–3 Brandywine stony sandy loam, rolling phase. Buckingham stony fine sandy loam, rolling phase. Catoctin stony silt loam: Rolling phase. Eroded rolling phase. Clifton stony silt loam, undulating and rolling phases. Legore stony silt loam, rolling shallow phase.	Most perennial legumes and grasses. Less sloping, less stony areas may be used for small grain and hay.	In general, not suited to cultivation. For the less sloping, less stony areas, small grain, several years of legumes and grass for hay or pasture.	1 to 2 tons every 3 to 4 years.
Unit VIs–4 Brandywine stony loam: Hilly phase. Eroded hilly phase. Brandywine stony sandy loam, hilly phase. Catoctin stony silt loam: Hilly phase. Eroded hilly phase. Legore stony silt loam, hilly shallow phase.	Grasses and most perennial legumes that are suited to pasture; lespedeza.	Not well suited to cultivation	1 to 2 tons every 3 to 4 years.
Unit VIs–5 Catlett stony silt loam: Undulating phase. Rolling phase. Eroded rolling phase. Penn cobbly silt loam, rolling phase.	Grasses and most perennial legumes that are suited to pasture; lespedeza. Corn and small grain are suitable for the least sloping parts.	Most acreage not well suited to cultivation. For least sloping areas that are suited, row crop, small grain, 2 to 4 years of legume-and-grass meadow.	2 tons of lime every 3 to 4 years.
Unit VIIe–1 Fauquier silty clay loam: Eroded hilly phase. Severely eroded hilly phase. Severely eroded rolling phase.	Grasses and most perennial legumes that are suited to pasture.	Not suited to cultivation	
Unit VIIe–2 Catlett stony silt loam, hilly phase. Penn loam, hilly phase. Penn silt loam: Hilly phase. Eroded rolling phase. Penn shaly silt loam: Eroded rolling phase. Eroded hilly phase. Eroded steep phase. Penn stony silt loam: Eroded hilly phase. Eroded steep phase.	Chiefly Virginia pine and some hardwoods. The most favorable areas may be suitable for legumes and grasses for pasture.	Not suited to cultivation	
Unit VIIe–3 Airmont stony loam, hilly phase. Buckingham stony fine sandy loam, steep phase. Catoctin silt loam, eroded steep phase. Manor silt loam, steep phase. Stony colluvial land, rolling and hilly phases.	Virginia pine and some hardwoods. The most favorable areas may be suitable for legumes and grasses for pasture.	Not suited to cultivation	
Unit VIIs–1 Brandywine stony loam, steep phase. Catoctin stony silt loam: Steep phase. Eroded steep phase. Legore stony silt loam, steep shallow phase.	Forest, and some of the less steep areas for legumes and grasses for pasture.	Not suited to cultivation	

See footnotes at end of table.

and supplementary practices [1]—Continued

General fertilizer requirements for rotations [2]	Suitable tillage practices	Supplementary measures for water control [3]	Suitable liming and fertilizer practices to establish and maintain permanent pasture [2]
Complete fertilizer but chiefly phosphate and potash. Little or no nitrogen is needed with manure or legumes.	Deep and early plowing, shallow cultivation, and firm seedbed.		1 to 2 tons of lime every 3 to 4 years. Heavy applications of complete fertilizer (or manure and phosphate or manure and phosphate and potash) every 3 to 4 years.
Heavy applications of complete fertilizer; or manure and phosphate and potash.	Deep and early plowing, shallow cultivation, and firm seedbed.		1 to 2 tons of lime every 3 to 4 years. Heavy applications of complete fertilizer (or manure and phosphate and potash) every 3 to 5 years.
Heavy applications of complete fertilizer; or manure and phosphate and potash.	Deep and early plowing, shallow cultivation, and firm seedbed.	Stripcropping on areas needed for cultivation.	1 to 2 tons of lime every 3 to 4 years. Heavy applications of complete fertilizer (or manure and phosphate and potash) every 3 to 5 years.
Heavy applications of complete fertilizer; or manure with phosphate and potash.	Deep and early plowing, shallow cultivation, and firm seedbed.	Stripcropping on areas needed for cultivation.	2 tons of lime every 3 to 4 years. Heavy applications of complete fertilizer (or manure and phosphate and potash) every 3 to 4 years.
			2 tons of lime every 3 to 5 years. Heavy applications of complete fertilizer (or manure and phosphate and potash) every 3 to 5 years.
			Areas suited to pasture need 1 to 2 tons of lime every 3 to 4 years. They also need complete fertilizer (or manure and phosphate and potash) every 3 to 4 years.
			Areas suited to pasture need 1 to 2 tons of lime every 3 to 4 years. They also need complete fertilizer (or manure and phosphate and potash) every 3 to 4 years.
			Areas suited to pasture need 1 to 2 tons of lime every 3 to 4 years. They also need complete fertilizer (or manure and phosphate and potash) every 3 to 4 years.

TABLE 2.—*Suitable crops, cropping systems,*

Capability unit and soil	Suitable uses	Rotations or cropping systems	Lime requirements per acre to maintain pH of 6.0 to 6.5 for common crops and pH of 6.5 to 7.2 for alfalfa [2]
Unit VIIs-2 Athol very rocky silt loam: Rolling phase. Undulating phase. Iredell-Mecklenburg stony silt loams, undulating and rolling phases. Rocky land: Rolling acidic rock phase. Hilly acidic rock phase. Rolling basic rock phase. Hilly basic rock phase. Very rocky land: Acidic rock phase. Basic rock phase.	Virginia pine and some hardwoods.	Not suited to cultivation	

[1] Prepared by the Virginia Agricultural Experiment Station.
[2] Soils should first be tested to determine need for liming and specific fertilizer. Note the past use and crops to be grown.
[3] For cultivated areas only. Where stripcropping, terracing, or both, are named, it is understood that the relief is suitable and that contour cultivation is automatically a part of such practices.
[4] Wherever used, whiteclover includes ladino clover.

Capability unit IIe-1

This unit consists of undulating silt loam soils of the upland developed over limestone. The subsoils of these soils are chiefly firm clay loam grading to clay. They are permeable to roots. The depth to bedrock ranges from 6 to 10 feet. Moisture conditions are favorable, as the soils are well drained and runoff is not difficult to control. The capacity to hold water that plants can use is moderate. The fertility and amount of organic matter are moderate to high. The reaction ranges from medium acid in the surface soil to neutral in the subsoil.

These soils are easily worked, although they have less favorable tilth than the soils in capability unit I–1. Gravel in Athol gravelly silt loam, undulating phase, interferes a little with cultivation. The soils respond to good management. They are suited to a wide variety of crops. The firm subsoils make them less favorable to root crops and vegetables than the more sandy open soils.

The soils of this unit are—

Athol silt loam, undulating phase.
Athol gravelly silt loam, undulating phase.

Capability unit IIe-2

This unit consists of undulating, dominantly medium-textured soils of the upland (fig. 2). These soils have moderately permeable subsoils that are chiefly clay loam and silty clay loam. Except in a few shallow inclusions and rock outcrops, the depth to bedrock ranges from 4 to as much as 100 feet. These soils have good moisture conditions. They are well drained and do not have a large amount of runoff under good management. The capacity to hold water that plants can use is moderate. The fertility and amount of organic matter are medium. The reaction ranges from medium to very strongly acid.

The soils of this unit are lower in fertility and organic matter and more acid than those of capability unit IIe-1. In addition, the subsoil has a little less clay and is more permeable. The soils of unit IIe-2 respond well to good management and are suited to a wide variety of crops.

Figure 2.—**Wheat grown on Chester loam and silt loam, undulating phases, near Purcellville.**

The soils of this unit are—

Bucks silt loam, undulating phase.
Chester loam, undulating phase.
Chester silt loam, undulating phase.
Chester loam and silt loam, undulating phases.
Chester-Brandywine loams and sandy loams, undulating phases.
Dyke cobbly silty clay loam, undulating phase.
Elioak silt loam, undulating phase.
Eubanks-Chester loams and silt loams, undulating phases.
Fauquier silt loam, undulating phase.
Glenelg silt loam, undulating phase.
Montalto silt loam, undulating shallow phase.
Myersville silt loam, undulating phase.
Whiteford silt loam, undulating phase.
Wickham loam.

Capability unit IIe-3

This unit consists of nearly level to undulating loam soils on low stream terraces along the Potomac River. These soils have loam to silty clay loam subsoils and moderate to moderately rapid permeability. The depth

and supplementary practices [1]—Continued

General fertilizer requirements for rotations [2]	Suitable tillage practices	Supplementary measures for water control [3]	Suitable liming and fertilizer practices to establish and maintain permanent pasture [2]
			Areas suited to pasture need 1 to 2 tons of lime every 3 to 4 years. They also need complete fertilizer (or manure and phosphate and potash) every 3 to 4 years.

to gravel beds or other coarse material ranges from 8 to 30 feet. Moisture conditions are very favorable. The soils are well drained, and the amount of runoff is not great under good management. The soils have a high capacity to hold water that plants can use. The fertility and the amount of organic matter are medium to high. The reaction ranges from medium to very strongly acid.

These soils are easily worked, and tilth is good. They respond to good management and can be kept productive. They are suited to a wide variety of crops, including truck crops.

The soils of this unit are—

Elk loam.
Sequatchie loam.

Capability unit IIe-4

This unit consists of undulating, medium-textured soils on old colluvium. Gravel in the plow layer of two of the soils interferes with cultivation. The soils of this unit have firm, moderately fine textured, permeable subsoils. The depth to bedrock ranges from 4 to 25 feet. The moisture conditions are moderately favorable. The soils are moderately well drained to well drained and do not have a great amount of runoff under good management. They have a moderate capacity to hold water that plants can use. The fertility and organic matter are medium, and the reaction ranges from medium to strongly acid.

These soils respond well to good management. They are suited to a fairly wide variety of crops.

The soils of this unit are—

Braddock gravelly loam, undulating phase.
Thurmont gravelly loam, undulating phase.
Unison silt loam, undulating phase.

Capability unit IIw-1

This unit consists of nearly level to very gently sloping, medium-textured soils on young local alluvium or recent colluvium. These soils have friable and permeable subsoils. The depth to bedrock ranges from 2½ to 25 feet but is generally more than 7 feet. The moisture conditions are favorable. The soils are moderately well drained to well drained, and their capacity to hold moisture that plants can use is high. Erosion caused by runoff from higher adjacent areas is a hazard, however. The fertility and organic matter are medium to high, and the reaction is medium to strongly acid.

These soils are easy to work, and tilth is good. They are suited to a wide variety of crops and produce good yields.

The soils of this unit are—

Emory silt loam.
Manassas silt loam.
Meadowville loam.
Meadowville silt loam.
Meadowville silt loam, cobbly variant.

Capability unit IIIe-1

Only one soil is in this unit. It is a rolling gravelly silt loam soil of the upland developed over limestone. The subsoil, which is permeable to roots of common crops, is firm silty clay loam grading to clay. The depth to bedrock ranges from 4 to 10 feet. The moisture conditions are favorable, as the soil is well drained and has moderate capacity to hold moisture that plants can use. Runoff must be controlled, however. The fertility and amount of organic matter are moderate. The reaction ranges from medium acid to very strongly acid in the surface soil and subsoil.

Although the plow layer has good tilth, gravel and moderate slopes hamper cultivation. The soil responds to good management and is suitable for a moderately wide variety of crops.

The soil in this unit is—

Athol gravelly silt loam, rolling phase.

Capability unit IIIe-2

This unit consists of rolling, dominantly medium-textured soils of the upland. The subsoils are moderately fine textured and moderately permeable. The depth to bedrock ranges from 2 to 95 feet. The soils have fairly good moisture conditions, as they are well drained and have a moderate capacity to hold moisture that plants can use. Runoff must be controlled, however. The fertility and amount of organic matter are medium. The reaction ranges from medium to very strongly acid. These soils respond to good management and are suited to a wide variety of crops.

The soils in this unit are—

Chester loam and silt loam, rolling phases.
Chester-Brandywine loams and sandy loams, rolling phases.
Elioak silt loam, rolling phase.
Eubanks-Chester loams and silt loams, rolling phases.
Fauquier silt loam, rolling phase.
Glenelg silt loam, rolling phase.
Myersville silt loam, rolling phase.
Whiteford silt loam, rolling phase.

Capability unit IIIe-3

This unit consists of undulating and rolling silty clay loam soils with silty clay loam to clay subsoils that are moderately permeable. The depth to bedrock ranges from 1½ to 25 feet. These soils have fair moisture conditions. They are well drained, but their capacity to hold moisture that plants can use is low. Runoff must be controlled. The fertility is moderate, although the amount of organic matter is low. The reaction ranges from medium to strongly acid.

These soils respond to good management, but their use is limited chiefly to hay crops, pasture, and woodland.

The soils of this unit are—

Dyke cobbly silty clay loam, eroded rolling phase.
Fauquier silty clay loam, eroded undulating phase.
Fauquier silty clay loam, eroded rolling phase.

Capability unit IIIe-4

This unit consists of undulating, cobbly and gravelly silt loam soils of the upland. These soils have moderately fine textured subsoils and moderate to moderately rapid permeability. The depth to bedrock shale and sandstone ranges from 2 to 5 feet. The moisture conditions are fair to good. The soils are well drained, but they have a low capacity to hold moisture that plants can use. Runoff is not difficult to control under good management, however. The fertility and organic matter are low, and the reaction is strongly to very strongly acid.

These soils are easy to work, although cobbles and gravel interfere somewhat with cultivation. Good tilth is easy to maintain. The soils respond well to good management and are suited to a fairly wide range of crops.

The soils of this unit are—

Brecknock gravelly silt loam, undulating phase.
Bucks cobbly silt loam, undulating phase.

Capability unit IIIe-5

This unit consists of dominantly undulating loam and silt loam soils. These soils have moderately fine textured subsoils that are shallow to moderately shallow to bedrock shale and sandstone. Their permeability is moderately rapid to rapid. The moisture conditions are poor to fair. The internal drainage is adequate, but the capacity to hold moisture that plants can use is low. Runoff develops quickly during rains. The fertility and amount of organic matter are low, and the reaction is strongly to very strongly acid.

Mainly because of the shallow root zone and limited capacity to hold moisture that plants can use, these soils do not respond well to good management. They are suitable for only a limited variety of crops (fig. 3).

The soils in this unit are—

Brecknock gravelly silt loam, rolling phase.
Catlett gravelly silt loam, undulating phase.
Penn cobbly silt loam, undulating phase.
Penn loam, undulating phase.
Penn shaly silt loam, eroded undulating phase.
Penn silt loam, undulating phase.
Penn silt loam, eroded undulating phase.

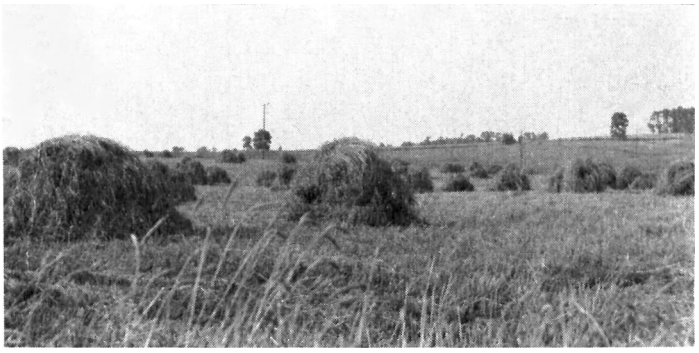


Figure 3.—**Most hay is baled in the field, but some farmers still cut, rake, and shock. The hay is either stored in the barn or stacked in the field. This crop is on Brecknock soils.**

Capability unit IIIe-6

This unit consists of undulating to rolling loam soils on high stream terraces. These soils have firm, moderately fine textured, moderately permeable subsoils. The depth to bedrock or gravel ranges from 8 to 35 feet. The moisture conditions are good to very good. The soils are moderately well drained to well drained and have a moderate capacity to hold water that plants can use. Runoff is not hard to control under good management.

These soils are fairly easy to work. Good tilth is not difficult to maintain. The soils respond to good management and are suited to nearly all local crops.

The soils of this unit are—

Hiwassee loam, undulating light surface variant.
Masada loam, undulating phase.

Capability unit IIIe-7

This unit consists of undulating and rolling cobbly loams on high stream terraces. These soils have firm, moderately fine textured, and moderately permeable subsoils. The depth to bedrock ranges from 5 to 30 feet. The moisture conditions are fair to good. The soils are moderately well drained to well drained, and their capacity to hold moisture that plants can use is moderate. Special practices to control runoff are needed on the stronger slopes.

The cobbles hamper cultivation, but good tilth is easy to maintain. These soils respond to good management. They are suited to a wide variety of crops, except in places where cobbles interfere with mowing and cultivation.

The soils of this unit are—

Hiwassee cobbly loam, undulating light surface variant.
Hiwassee cobbly loam, rolling light surface variant.
Masada cobbly loam, undulating phase.

Capability unit IIIe-8

This unit consists of rolling and undulating, gravelly, stony, and cobbly, medium-textured soils on old collu-

vium. These soils have friable to firm, moderately fine textured, permeable subsoils. The depth to bedrock ranges from 4 to 25 feet. The moisture conditions range from fair to very good. The soils are moderately well drained to well drained and have a moderate capacity to hold moisture that plants can use. Runoff requires special control. Tilth is good, but the gravelly, cobbly, and stony types are hard to work. The fertility and amount of organic matter are medium to low. The reaction ranges from medium to strongly acid. Although these soils respond well to good management, they are not well suited to many crops.

The soils of this unit are—

Braddock cobbly loam, undulating phase.
Braddock gravelly loam, rolling phase.
Thurmont cobbly loam, undulating phase.
Thurmont gravelly loam, rolling phase.
Unison silt loam, rolling phase.
Unison stony silt loam, undulating phase.

Capability unit IIIw–1

This unit consists of undulating, medium-textured soils with a restricted root zone. This root zone is limited in depth to about 20 inches because of a pan, shallowness to bedrock, or wetness at this depth. Above 20 inches, the soils are permeable and the plow layers have good tilth. Gravel in one of the soils (Trego) hampers cultivation. Moisture conditions for this unit are fair to good. The capacity to hold moisture that plants can use is moderate. Runoff is not difficult to control under good management. Excess moisture, however, is more common than in the deeper, permeable soils.

The fertility and amount of organic matter are medium to low. The reaction is strongly to very strongly acid. Although these soils respond to good management, they are somewhat limited in variety of crops to which they are suited.

The soils of this unit are—

Belvoir loam.
Calverton silt loam, undulating phase.
Captina silt loam.
Captina silt loam, high terrace phase.
Readington silt loam, undulating phase.
Trego gravelly silt loam.

Capability unit IIIw–2

This unit consists of nearly level silt loam soils on first bottoms subject to overflow. These soils have friable and permeable subsoils. The depth to bedrock or other material unfavorable to roots is 3½ to 25 feet. The moisture conditions are fair. The soils are somewhat poorly drained to moderately well drained and have a high capacity to hold moisture that plants can use. Erosion from runoff is not a great hazard, but overflow is a problem. Excess moisture hampers cultivation, and careful management is required to maintain good tilth. Tillage is moderately easy when moisture conditions are favorable.

The fertility and amount of organic matter are medium to high. The reaction ranges from neutral to strongly acid. Good management can improve these soils, especially in the less well drained areas. These soils are suitable for only a limited variety of crops.

The soils of this unit are—

Chewacla silt loam.
Lindside silt loam.
Rowland silt loam.

Capability unit IIIs–1

This unit consists of stony, undulating to rolling, well-drained soils of the upland. These soils have subsoils that are chiefly moderately permeable clay loam and silty clay loam. Bedrock is moderately deep to deep. Moisture conditions are fairly good. The soils are well drained and have a moderate capacity to hold water that plants can use. Erosion from runoff is a hazard, however. The fertility and amount of organic matter are medium, and the reaction is strongly acid. Although these soils respond well to good management, stoniness limits the range of use.

The soils of this unit are—

Eubanks-Chester stony loams and silt loams, undulating phases.
Eubanks-Chester stony loams and silt loams, rolling phases.
Fauquier stony silt loam, rolling phase.
Myersville stony silt loam, undulating phase.
Myersville stony silt loam, rolling phase.

Capability unit IVe–1

This unit consists of dominantly undulating to rolling soils with firm to extremely firm clay subsoils at 13 to 20 inches. The moisture relations are poor to fair. The soils are somewhat poorly to moderately well drained, but the capacity to hold moisture that plants can use is low. Erosion from runoff is a hazard (fig. 4). The fertility and amount of organic matter are medium to high.

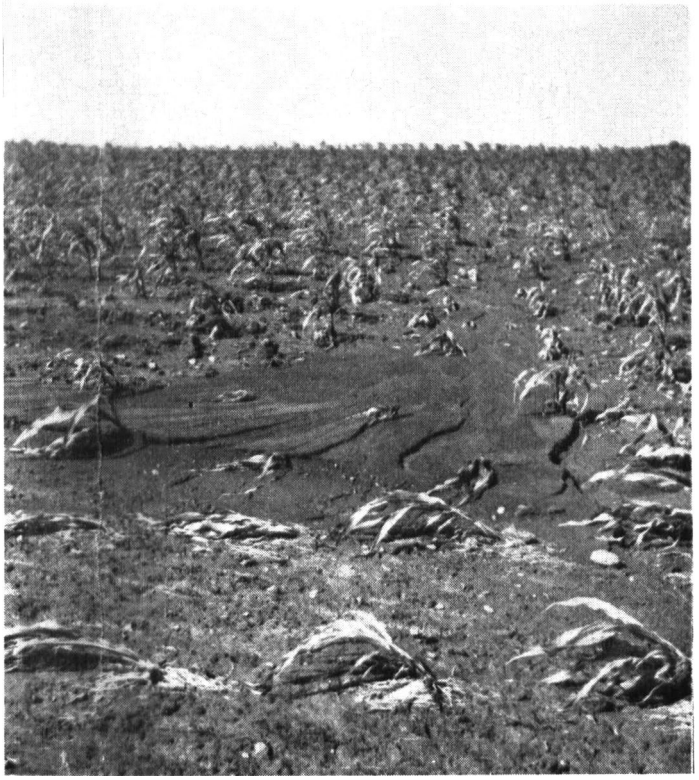


Figure 4.—**Active sheet erosion on Iredell-Mecklenburg silt loams, eroded rolling phases.**

Reaction ranges from slightly to strongly acid. The surface layers have good tilth, except in eroded areas where the clayey subsoils are within plow depth. These soils do not respond as well to good management as the deeper more friable ones. Suitable crops are chiefly small grain and grass.

The soils of this unit are—

Iredell-Mecklenburg silt loams, undulating phases.
Iredell-Mecklenburg silt loams, eroded undulating phases.
Iredell-Mecklenburg silt loams, rolling phases.
Iredell-Mecklenburg silt loams, eroded rolling phases.
Kelly silt loam, undulating phase.

Capability unit IVe-2

This unit consists of dominantly rolling, friable soils of the upland that are shallow to bedrock. These soils have friable to very friable permeable loam and silt loam subsoils. Moisture relations are poor to fair. These soils are somewhat excessively drained to excessively drained, and their capacity to hold moisture that plants can use is low. Runoff water accumulates quickly, and erosion is a hazard. The fertility and amount of organic matter are low to medium. The reaction ranges from medium to very strongly acid. The plow layer has good tilth, but weathered rock fragments are abundant in places because of the shallow depth to bedrock. If cultivated, these soils require careful management.

The soils of this unit are—

Brandywine loam and silt loam, rolling phases.
Brandywine sandy loam, rolling phase.
Catoctin silt loam, rolling phase.
Hazel silt loam, rolling phase.
Legore silt loam, undulating shallow phase.
Legore silt loam, rolling shallow phase.
Manor silt loam, rolling phase.

Capability unit IVw-1

This unit consists of nearly level to undulating soils with plastic clay subsoils. The moisture relations are very poor to fair. Erosion from runoff is not a great hazard. However, drainage is poor in most of the soils, and the capacity of the soils to hold water that plants can use is low due to the shallow depth to the plastic clay material. The fertility and the amount of organic matter vary greatly. The reaction ranges from medium to extremely acid.

Although the plow layer has good tilth, wetness shortens the cultivation period. These soils respond moderately well to good management. They are suitable for only a limited range of use, especially where there is no drainage system.

The soils of this unit are—

Calverton silt loam, level phase.
Croton silt loam, level phase.
Croton silt loam, undulating phase.
Elbert silt loam, level phase.
Elbert silt loam, undulating phase.
Elbert stony silt loam, colluvial phase.
Kelly silt loam, level phase.
Rohrersville silt loam.
Rohrersville stony silt loam.
Worsham silt loam.

Capability unit IVs-1

This unit consists of friable, stony, undulating and rolling soils that are shallow to dominantly basic bedrock. The moisture relations are poor to fair. These soils are well drained to excessively drained; consequently, ground water is not retained long. Erosion from runoff is a hazard on the more sloping parts. The capacity of the soils to hold moisture that plants can use is low. The amount of organic matter is low. Although the fertility is not high in these soils, it is higher than in the soils of unit IVs-2. Generally, the soils of this unit are better soils than those of capability unit IVs-2. The reaction is medium to strongly acid. The plow layer is difficult to till, chiefly because of the shallow profile. These soils respond somewhat to good management, but their range of use is limited.

The soils of this unit are—

Brandywine stony loam, rolling phase.
Brandywine stony sandy loam, undulating phase.
Legore stony silt loam, undulating shallow phase.
Montalto stony silt loam, undulating shallow phase.
Montalto stony silt loam, rolling shallow phase.

Capability unit IVs-2

This unit consists of friable, rolling soils that are shallow to shaly bedrock. On some of the soils, cobbles and gravel hamper cultivation. The moisture relations are poor to fair. Although the drainage is adequate, erosion from runoff is a marked hazard. The capacity to hold moisture that plants can use is low. The amount of organic matter is low, and fertility is lower than in the soils of unit IVs-1. The reaction ranges from strongly to very strongly acid.

The tilth of the plow layer is poor, chiefly because of the shallow profile. Although these soils respond somewhat to good management, their use is limited mostly to permanent pasture and forest.

The soils of this unit are—

Bucks cobbly silt loam, rolling phase.
Catlett gravelly silt loam, rolling phase.
Penn loam, rolling phase.
Penn silt loam, rolling phase.

Capability unit IVs-3

This unit consists of cobbly and stony soils that are dominantly rolling. These soils have permeable sandy clay loam to silty clay loam subsoils. They have a thick, friable root zone. The moisture relations are good, as the soils are well drained to moderately well drained and have a moderate capacity to hold moisture that plants can use. However, erosion from runoff is a hazard. The amount of organic matter and plant nutrients is medium to low. The reaction is strongly acid to extremely acid. Tilth is good, but cobbles, stones, and rolling slopes make cultivation difficult. These soils respond well to good management, but they are limited chiefly to long rotations consisting mostly of permanent pasture, and to forest.

The soils of this unit are—

Airmont stony loam, undulating phase.
Airmont stony loam, rolling phase.
Braddock cobbly loam, rolling phase.
Thurmont cobbly loam, rolling phase.
Unison stony silt loam, rolling phase.

Capability unit Vw-1

This unit consists of wet, nearly level, permeable, deep soils on first bottoms. The moisture relations are very poor to poor. Erosion from runoff is no hazard, and the capacity to hold moisture that plants can use is high.

However, drainage is very poor to poor and flooding is a hazard. The fertility and amount of organic matter are high for most areas. An exception is Robertsville silt loam. The reaction ranges from neutral to strongly acid.

The tilth of the plow layer is good. However, prevailing wetness makes cultivation impractical most of the time, except where there is artificial drainage. These soils do not respond well to good management, unless there is adequate drainage, and they have only a narrow range of use.

The soils of this unit are—

Bowmansville silt loam.
Melvin silt loam.
Mixed alluvial land.
Robertsville silt loam.
Wehadkee silt loam.

Capability unit VIe–1

This unit consists of hilly, moderately deep or deep, permeable soils. The depth to bedrock ranges from 1½ to 90 feet. These soils have friable to firm subsoils that are dominantly silty clay loam. The moisture relations are fair; the soils are well drained, and they have a moderate capacity to hold water that plants can use. However, erosion from runoff is a serious hazard. The amount of organic matter is low to medium, and the fertility is low to moderately high. Although the plow layer has good tilth, strong slopes make these soils hard to work. The soils respond well to good management, but their use is limited because of the strong slopes.

The soils of this unit are—

Elioak silt loam, hilly phase.
Fauquier silt loam, hilly phase.
Glenelg silt loam, hilly phase.
Myersville silt loam, hilly phase.
Myersville silt loam, eroded hilly phase.
Whiteford silt loam, hilly shallow phase.

Capability unit VIe–2

This unit consists of hilly and steep, friable soils of the upland that are shallow to bedrock. These soils have friable to very friable, permeable loam and silt loam subsoils. The moisture relations are poor. The soils are somewhat excessively drained to excessively drained, and the capacity to hold moisture that plants can use is low. Erosion hazard from runoff is very high. The fertility and amount of organic matter are low to medium, and the reaction ranges from medium to very strongly acid. Although the plow layer has good tilth, the strong slopes and shallow profile, especially in eroded places, make cultivation with machinery difficult. These soils do not respond greatly to good management, and their use is limited.

The soils of this unit are—

Brandywine loam and silt loam, hilly phases.
Brandywine loam and silt loam, eroded hilly phases.
Brandywine loam and silt loam, steep phases.
Brandywine sandy loam, hilly phase.
Brandywine sandy loam, steep phase.
Catoctin silt loam, hilly phase.
Catoctin silt loam, eroded hilly phase.
Catoctin silt loam, steep phase.
Hazel silt loam, hilly phase.
Hazel silt loam, steep phase.
Legore silt loam, hilly shallow phase.
Manor silt loam, hilly phase.

Capability unit VIs–1

This unit consists of undulating and rolling soils with firm silty clay subsoils and many limestone outcrops. In most places the depth of the soil between the outcrops to bedrock is a few feet. In some places, however, it is much deeper. The moisture relations are poor to good. The soils are well drained, but runoff develops rapidly on shallow parts. The capacity to hold moisture that plants can use ranges from low to moderate, according to the depth to bedrock. The fertility and amount of organic matter are moderate to high, and the reaction ranges from neutral to medium acid.

Although the tilth is fair to good, the rock outcrops and shallow profile make these soils unsuitable for cultivation. The soils respond somewhat to fertilizer, but their use is limited to pasture and forest.

The soils of this unit are—

Athol rocky silt loam, undulating phase.
Athol rocky silt loam, rolling phase.

Capability unit VIs–2

This unit consists of stony, rolling to steep soils with permeable, moderately firm textured subsoils. The depth to bedrock ranges up to 12 feet (the parent rocks are granodiorite, schist, greenstone, and slate). The moisture relations are poor to fair. Although the drainage is good and the capacity to hold moisture that plants can use is moderate, the hazard of erosion from runoff is high. The fertility and amount of organic matter are medium to low. The reaction ranges from medium to very strongly acid. These soils are limited in use because of their stoniness and dominantly strong slopes. Their response to good pasture management is moderate.

The soils of this unit are—

Eubanks-Chester stony loams and silt loams, hilly phases.
Fauquier stony silt loam, hilly phase.
Myersville stony silt loam, steep phase.
Myersville stony silt loam, eroded steep phase.
Whiteford stony silt loam, rolling phase.
Whiteford stony silt loam, hilly phase.

Capability unit VIs–3

This unit consists of stony, shallow, rolling soils with friable subsoils. These soils are permeable; their moisture relations are poor to fair. They are well to excessively drained, but the capacity to hold moisture that plants can use is low. Erosion from runoff is a hazard. The fertility and amount of organic matter are medium to low, and the reaction is medium to strongly acid. Although these soils have good tilth, stones and shallow depth to bedrock make cultivation difficult. The soils respond somewhat to good pasture practices, but they have a narrow range of use.

The soils of this unit are—

Brandywine stony sandy loam, rolling phase.
Buckingham stony fine sandy loam, rolling phase.
Catoctin stony silt loam, rolling phase.
Catoctin stony silt loam, eroded rolling phase.
Clifton stony silt loam, undulating and rolling phases.
Legore stony silt loam, rolling shallow phase.

Capability unit VIs–4

This unit consists of stony, shallow, hilly soils with friable, permeable subsoils. The moisture relations are poor. The soils are somewhat excessively drained to

excessively drained. The capacity to hold moisture that plants can use is low, and the hazard of erosion from runoff is high. The fertility and amount of organic matter are low to medium, and the reaction ranges from strongly to extremely acid.

The plow layer is friable, but stones, shallow depth to bedrock, and strong slopes make cultivation difficult. These soils do not respond well to good management, and their use is limited chiefly to pasture and forest.

The soils of this unit are—

Brandywine stony loam, hilly phase.
Brandywine stony loam, eroded hilly phase.
Brandywine stony sandy loam, hilly phase.
Catoctin stony silt loam, hilly phase.
Catoctin stony silt loam, eroded hilly phase.
Legore stony silt loam, hilly shallow phase.

Capability unit VIs–5

This unit consists of undulating and rolling, stony, very shallow soils. These soils are friable and permeable. However, because of the shallow depth to bedrock, they have a low capacity to hold moisture that plants can use. The soils, therefore, are droughty; the depth of the root zone is restricted; and tillage is difficult. The soils do not respond well to good management, and their use is limited chiefly to woodland and pasture.

The soils of this unit are—

Catlett stony silt loam, undulating phase.
Catlett stony silt loam, rolling phase.
Catlett stony silt loam, eroded rolling phase.
Penn cobbly silt loam, rolling phase.

Capability unit VIIe–1

This unit consists of hilly and severely eroded, rolling soils with moderately permeable silty clay loam subsoils. The permeability throughout is moderate. The depth to bedrock ranges from 1 to 8 feet. The moisture conditions are poor to fair. The soils are well drained, but they have a low capacity to hold moisture that plants can use, and the hazard of erosion from runoff is high. The fertility and amount of organic matter are low, especially for the severely eroded phases. The reaction ranges from medium to strongly acid. These soils respond to good management, but their use is limited to pasture and forest.

The soils of this unit are—

Fauquier silty clay loam, eroded hilly phase.
Fauquier silty clay loam, severely eroded hilly phase.
Fauquier silty clay loam, severely eroded rolling phase.

Capability unit VIIe–2

This unit consists of excessively drained, hilly and steep, shaly or stony soils, which are very shallow to shaly rock. The moisture relations are very poor; the capacity to hold moisture that plants can use is very low; and the hazard of erosion is high. The fertility and amount of organic matter are low, and the reaction is very strongly acid. Cultivation is impractical because of the shallow depth and stones. These soils do not respond well to good management, and their use is limited to pasture and woodland.

The soils of this unit are—

Catlett stony silt loam, hilly phase.
Penn loam, hilly phase.
Penn silt loam, hilly phase.
Penn silt loam, eroded rolling phase.
Penn shaly silt loam, eroded rolling phase.
Penn shaly silt loam, eroded hilly phase.
Penn shaly silt loam, eroded steep phase.
Penn stony silt loam, eroded hilly phase.
Penn stony silt loam, eroded steep phase.

Capability unit VIIe–3

This unit consists of very stony and rocky soils. Much of the acreage has no soil, and nearly all areas have too little to produce crops and pasture. Some spots of colluvial soil are deep enough to grow trees and a little pasture.

The soils of this unit are—

Airmont stony loam, hilly phase.
Buckingham stony fine sandy loam, steep phase.
Catoctin silt loam, eroded steep phase.
Manor silt loam, steep phase.
Stony colluvial land, rolling and hilly phases.

Capability unit VIIs–1

This unit consists of stony and steep soils that are shallow to bedrock. These soils are permeable, but moisture relations are poor. The capacity to hold moisture that plants can use is low, and the hazard of erosion from runoff is very high. The fertility and amount of organic matter are low to medium, and the reaction ranges from strongly to extremely acid.

The plow layer is friable, but cultivation is impractical because of stones, shallow depth to bedrock, and steep slopes. These soils do not respond well to good management and are suitable mostly for forest and pasture.

The soils of this unit are—

Brandywine stony loam, steep phase.
Catoctin stony silt loam, steep phase.
Catoctin stony silt loam, eroded steep phase.
Legore stony silt loam, steep shallow phase.

Capability unit VIIs–2

This unit consists of rocky and stony soils. All of the area is unsuitable for cultivation (fig. 5). Most of the surface is rock or stones, and only a few places have soil more than 6 inches deep. The capacity to hold moisture that plants can use is very low. The slopes range from undulating to hilly, and the soil consistence ranges from friable to very firm. The productivity for grass and trees is low.

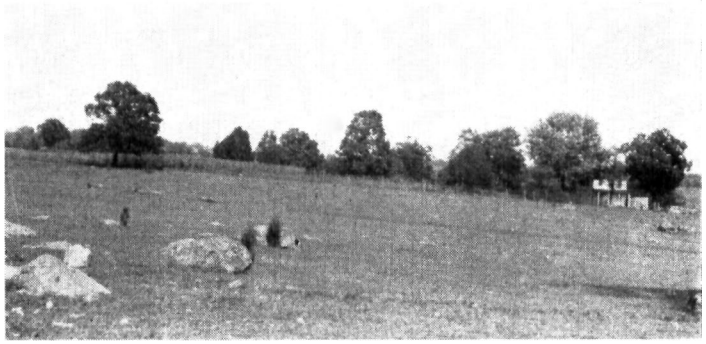


Figure 5.—**Pasture on Iredell-Mecklenburg stony silt loams, undulating and rolling phases. The most suitable use is for pasture.**

The soils of this unit are—

Athol very rocky silt loam, rolling phase.
Athol very rocky silt loam, undulating phase.
Iredell-Mecklenburg stony silt loams, undulating and rolling phases.
Rocky land, rolling acidic rock phase.
Rocky land, hilly acidic rock phase.
Rocky land, rolling basic rock phase.
Rocky land, hilly basic rock phase.
Very rocky land, acidic rock phase.
Very rocky land, basic rock phase.

Productivity Ratings

Productivity ratings for crops and pasture are given in table 3. The productivity rating for each crop is a percentage of the standard yield, which is given at the top of the column for the stated crop. The standard yield is the approximate average yield obtained (without the use of fertilizer or other amendments) on the more productive soils in the United States where the crop is most extensively grown. A productivity rating of 50 for a Loudoun County soil means that the soil is about half as productive of a certain crop as the soil with the standard yield. Soils that have been limed or fertilized or that are unusually productive may have a productivity rating of more than 100 for some crops.

The productivity rating index is calculated as follows:

$$\text{Productivity rating index} = \frac{\text{Expected yield per acre} \times 100}{\text{Standard yield per acre}}$$

These ratings cannot be interpreted directly into land values, as many other factors, such as distance to market, must be considered. The ratings can be used for comparing yields of specific crops on different soils within the county and for comparing soils of Loudoun County with those in other parts of the United States.

The yield data were collected by the soil scientists in the field at the time of this survey. Some ratings are based on data obtained from experiment stations and from farm records. Where sufficient data were not available, yields were obtained by comparison with soils on which data were available, by field observations, and by consultations with farmers and agricultural specialists.

The figures in columns A show the percentage of the standard yield that can be expected under common management. Such management includes crop rotations and the use of low to moderate amounts of fertilizer for corn, small grain, and vegetables. Each year, corn and small grain generally receive 200 to 300 pounds an acre of 3-12-6, or the equivalent. Common rotations on the uplands, colluvial lands, and terraces last 4 to 6 years, and on the bottom lands, 2 years. Small amounts of manure are used, mostly on eroded areas. Lime is used for legumes. Some hay crops are topdressed with phosphate, and some corn is sidedressed with nitrogen fertilizer. Alfalfa and tobacco are given relatively heavy applications of lime and fertilizer.

Only a small part of the permanent pasture is topdressed with fertilizer, but manure is applied to small spots every few years. A few permanent pastures are clipped, and some are burned. A few are limed and topdressed with phosphate fertilizer.

Common management practices are not the same on all soils. Some of the common uses and management practices on the different soils are given in the section Soil Series, Types, and Phases.

Just as different crops require different treatment on the same soil, the same crop may have different requirements on different soils. Also, a level may be reached where it is no longer economically feasible to intensify the management further. This level depends on the soil, the crops, the type of farm, prices, and many other factors. The uncertainty of these factors makes it impossible to define the practical limits to production.

The figures in columns B show the percentage of the standard yields that may be expected under good management. Good management includes the proper choice and rotation of crops, the correct use of commercial fertilizer, lime and manure, proper tillage methods, the return of organic matter to the soil, and engineering measures to control water on the land where necessary to maintain or increase soil productivity within practical limits. The yields in columns B, when compared with those shown in columns A, give some idea of the response crops can be expected to make to good soil management. They may be considered as production goals that can be reached by feasible management practices.

Although knowledge about good management required by specific soils for certain crops is somewhat limited, some deficiencies in the soils are known and others are considered probable. From this knowledge some of the practices required to produce the yields given in columns B are discussed in the section Use and Management of Soils.

500057—60——3

TABLE 3.—*Productivity ratings for crops and pasture*

[Productivity indexes in columns A are for ordinary soil management; those in columns B are for good soil management. Ratings are for rating is given, the crop is not commonly grown and the soil is not considered suitable for it under the management s

Soil	Corn (100=50 bu. an acre)		Wheat (100=25 bu. an acre)		Barley (100=40 bu. an acre)		Oats (100=50 bu. an acre)		Lespedeza hay (100=1.5 tons an acre)		Orchard-grass hay (100=2 tons an acre)		Mixed hay (100=2 tons an acre)		Alfalfa hay (100=4 tons an acre)		Potato (100=2 bu. an ac	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	
Airmont stony loam:																		
Hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Undulating phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Rolling phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Athol silt loam, undulating phase	145	180	80	108	100	125	80	110	95	125	90	110	100	115	85	110	50	
Athol gravelly silt loam:																		
Undulating phase	130	170	82	115	95	120	75	110	90	120	85	105	90	110	75	105	45	
Rolling phase	110	140	80	105	90	110	75	110	90	115	80	100	85	110	80	105	50	
Athol rocky silt loam:																		
Undulating phase	(5)	(5)	-----	-----	-----	-----	-----	-----	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	-----	
Rolling phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Athol very rocky silt loam:																		
Undulating phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Rolling phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Belvoir loam [6]	60	90	40	70	45	75	40	70	70	95	40	65	50	70	-----	-----	-----	
Bermudian silt loam [7]	150	165	(3)	(3)	(3)	(3)	(3)	(3)	95	115	80	95	85	100	(3)	(3)	50	
Bowmansville silt loam	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Braddock gravelly loam:																		
Undulating phase	115	145	85	105	90	115	80	115	90	120	90	110	85	105	75	105	65	
Rolling phase	105	135	75	100	80	105	75	110	80	110	80	100	75	95	70	100	60	
Braddock cobbly loam:																		
Undulating phase	100	130	70	95	75	95	70	100	80	110	80	100	70	95	55	80	45	
Rolling phase	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	
Brandywine loam and silt loam:																		
Rolling phases	85	105	65	95	55	85	55	85	75	95	75	95	60	85	(3)	(3)	50	
Hilly phases	-----	-----	-----	(3)	-----	(3)	-----	(3)	-----	-----	-----	(3)	-----	(3)	-----	-----	-----	
Eroded hilly phases	-----	-----	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	-----	-----	-----	-----	
Steep phases	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Brandywine sandy loam:																		
Rolling phase	70	95	60	90	50	80	50	80	65	90	70	90	50	75	(3)	(3)	40	
Hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Steep phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Brandywine stony loam:																		
Rolling phase	75	95	60	90	50	80	50	80	70	90	70	90	55	80	-----	-----	-----	
Hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Eroded hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Steep phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Brandywine stony sandy loam:																		
Undulating phase	75	100	(3)	(3)	(3)	(3)	(3)	(3)	60	90	70	90	60	80	(3)	(3)	45	
Rolling phase	-----	-----	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	-----	-----	
Hilly phase	-----	-----	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	-----	-----	
Brecknock gravelly silt loam:																		
Undulating phase	85	120	75	100	70	110	60	95	70	105	60	90	65	95	50	75	40	
Rolling phase	75	100	65	90	60	100	55	85	60	95	55	85	55	85	40	70	35	
Buckingham stony fine sandy loam:																		
Rolling phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Steep phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	

Bucks silt loam, undulating phase	120	160	75	112	80	110	70	112	85	120	80	105	80	105	70	100	55	
Bucks cobbly silt loam:																		
Undulating phase	95	120	60	90	70	90	60	85	70	95	65	85	60	90	55	85	(3)	(3)
Rolling phase	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	-----
Calverton silt loam:																		
Undulating phase [6]	50	75	(3)	(3)	(3)	(3)	(3)	(3)	60	75	35	65	40	65	-----	-----	-----	-----
Level phase [6]	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	-----	-----	(3)	(3)	-----	-----	-----	-----
Captina silt loam [6]	55	80	(3)	(3)	(3)	(3)	(3)	(3)	65	90	40	60	45	65	-----	-----	-----	-----
Captina silt loam, high terrace phase [6]	50	80	40	70	45	75	40	70	70	90	40	65	50	70	-----	-----	(3)	(3)
Catlett gravelly silt loam:																		
Undulating phase	40	70	55	90	55	85	45	75	60	85	40	70	45	75	-----	-----	-----	-----
Rolling phase	-----	(3)	(3)	(3)	(3)	(3)	(3)	(3)	50	75	30	60	35	65	-----	-----	-----	-----
Catlett stony silt loam:																		
Undulating phase	-----	-----	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	-----	-----	-----
Rolling phase	-----	-----	(3)	-----	-----	(3)	-----	-----	-----	(3)	-----	-----	-----	-----	-----	-----	-----	-----
Eroded rolling phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Catoctin silt loam:																		
Rolling phase	75	100	60	90	55	85	50	80	70	90	70	90	60	85	(3)	(3)	(3)	(3)
Hilly phase	-----	-----	-----	(3)	-----	(3)	-----	(3)	-----	-----	-----	(3)	-----	(3)	-----	-----	-----	-----
Eroded hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	(3)	-----	(3)	-----	(3)	-----	-----	-----	-----
Steep phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Eroded steep phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Catoctin stony silt loam:																		
Rolling phase	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	-----
Eroded rolling phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Eroded hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Steep phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Eroded steep phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Chester loam, undulating phase	135	175	80	110	110	135	80	115	95	125	90	110	90	110	70	95	75	10
Chester silt loam, undulating phase	145	185	82	115	110	135	82	120	100	130	95	115	95	110	80	105	60	8
Chester loam and silt loam:																		
Undulating phases	140	180	82	115	110	135	80	115	100	130	95	115	90	110	75	100	70	9
Rolling phases	110	140	80	105	90	115	75	110	95	125	85	105	85	105	70	95	65	8
Chester-Brandywine loams and sandy loams:																		
Undulating phases	115	145	75	100	85	110	70	100	90	120	85	105	80	100	65	90	75	10
Rolling phases	95	125	70	100	75	105	65	95	85	110	80	100	75	95	50	80	65	8
Chewacla silt loam [6 7]	115	160	-----	-----	-----	-----	-----	-----	90	105	70	90	80	95	-----	-----	-----	(3)
Clifton stony silt loam, undulating and rolling phases	-----	-----	-----	-----	-----	-----	-----	-----	-----	(3)	-----	-----	-----	(3)	-----	-----	-----	-----
Congaree silt loam [7]	155	170	(3)	(3)	(3)	(3)	(3)	(3)	100	120	85	100	90	105	(3)	(3)	60	10
Congaree fine sandy loam [7]	100	125	(3)	(3)	(3)	(3)	(3)	(3)	90	110	75	95	80	95	(3)	(3)	65	10
Croton silt loam:																		
Level phase [6 8]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Undulating phase [6 8]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Dyke cobbly silty clay loam:																		
Undulating phase	115	150	70	95	90	120	75	100	80	110	80	100	85	105	80	105	50	7
Eroded rolling phase	90	110	60	85	80	110	65	100	75	105	70	95	80	100	75	100	(3)	(3)
Elbert silt loam:																		
Level phase [6]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Undulating phase [6]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Elbert stony silt loam, colluvial phase [6]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Elioak silt loam:																		
Undulating phase	110	140	75	100	85	110	75	115	80	110	85	105	80	100	70	100	60	8
Rolling phase	100	130	75	95	70	100	75	105	75	100	75	100	70	95	65	90	50	7
Hilly phase	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	-----

See footnotes at end of table.

TABLE 3.—*Productivity ratings for crops and pasture*—Continued

Soil	Corn (100=50 bu. an acre)		Wheat (100=25 bu. an acre)		Barley (100=40 bu. an acre)		Oats (100=50 bu. an acre)		Lespedeza hay (100=1.5 tons an acre)		Orchard-grass hay (100=2 tons an acre)		Mixed hay (100=2 tons an acre)		Alfalfa hay (100=4 tons an acre)		Potatoe (100=2 bu. an ac	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	
Elk loam[9]	135	170	80	110	80	105	80	110	90	120	85	110	85	105	70	95	60	
Emory silt loam[9]	170	200	75	100	60	75	60	75	110	130	100	115	105	115	-----	-----	75	1
Eubanks-Chester loams and silt loams:																		
Undulating phases	135	185	80	110	105	130	80	115	100	130	90	110	90	110	75	100	70	
Rolling phases	110	140	75	100	85	110	75	110	90	120	85	105	85	105	70	95	60	
Eubanks-Chester stony loams and silt loams:																		
Undulating phases	110	140	65	95	75	100	70	100	85	115	75	95	75	95	60	85	65	
Rolling phases	85	110	60	90	65	85	60	85	80	100	70	90	65	90	50	75	65	
Hilly phases	-----	-----	-----	(3)	-----	(3)	-----	(3)	-----	-----	-----	(3)	-----	(3)	-----	(3)	-----	(
Fauquier silt loam:																		
Undulating phase	135	180	80	112	105	130	80	115	95	125	85	105	90	110	80	105	55	
Rolling phase	100	130	75	100	90	115	70	110	85	115	80	100	85	105	75	100	45	
Hilly phase	-----	-----	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	----	(3)	-----	(
Fauquier stony silt loam:																		
Rolling phase	80	105	55	80	70	90	60	90	70	90	65	85	60	80	50	75	(3)	(
Hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	(3)	-----	
Fauquier silty clay loam:																		
Eroded undulating phase	90	130	60	85	75	95	60	90	75	100	65	85	70	90	75	100	(3)	(
Eroded rolling phase	70	110	50	75	65	90	50	80	60	90	55	75	60	80	65	95	-----	
Eroded hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	
Severely eroded rolling phase	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	50	70	45	65	40	60	50	70	-----	
Severely eroded hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	(3)	----	(3)	-----	(3)	-----	(3)	-----	
Glenelg silt loam:																		
Undulating phase	105	135	75	100	80	105	70	105	75	105	80	100	75	95	60	85	65	
Rolling phase	90	115	70	90	65	95	70	100	65	95	75	95	65	90	55	80	60	
Hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	(3)	-----	(3)	-----	-----	-----	
Hazel silt loam:																		
Rolling phase	50	75	50	80	45	75	40	70	60	75	55	75	40	70	-----	(3)	(3)	(
Hilly phase	-----	-----	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	(3)	-----	-----	-----	
Steep phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Hiwassee loam, undulating light surface variant	105	125	65	95	80	105	75	110	90	120	85	105	80	100	65	95	80	1
Hiwassee cobbly loam:																		
Undulating light surface variant	95	120	60	90	70	90	60	90	85	105	75	95	70	95	55	85	65	
Rolling light surface variant	70	90	50	85	60	80	50	75	70	95	60	80	65	85	(3)	(3)	(3)	(
Huntington silt loam[7]	175	190	(3)	(3)	(3)	(3)	(3)	(3)	110	135	85	100	100	110	(3)	(3)	(3)	(
Iredell-Mecklenburg silt loams:																		
Undulating phases	70	95	50	75	60	80	55	85	75	90	70	85	60	80	-----	(3)	-----	
Eroded undulating phases	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	-----	-----	-----	
Rolling phases	65	90	50	75	55	75	50	80	70	85	65	80	55	75	-----	(3)	-----	
Eroded rolling phases	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	-----	-----	-----	
Iredell-Mecklenburg stony silt loams, undulating and rolling phases	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Kelly silt loam:																		
Undulating phase[6]	55	80	(3)	(3)	(3)	(3)	(3)	(3)	70	80	(3)	60	50	70	-----	-----	-----	
Level phase[6]	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	-----	-----	(3)	(3)	-----	-----	-----	

Legore silt loam:																		
Undulating shallow phase	90	115	65	95	60	90	60	90	75	100	75	100	70	95	-----	-----	[3]	
Rolling shallow phase	75	95	60	90	50	80	50	80	70	90	70	90	60	85	[3]	[3]	[3]	
Hilly shallow phase	-----	-----	-----	[3]	-----	[3]	-----	[3]	-----	-----	-----	[3]	-----	[3]	-----	-----	-----	
Legore stony silt loam:																		
Undulating shallow phase	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	-----	-----	
Rolling shallow phase	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	-----	-----	
Hilly shallow phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Steep shallow phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Lindside silt loam [6 7]	125	175	-----	-----	-----	-----	-----	-----	100	110	75	95	90	100	-----	-----	-----	
Manassas silt loam [9]	135	180	75	95	55	75	55	80	95	120	85	105	90	110	-----	[3]	60	
Manor silt loam:																		
Rolling phase	55	80	50	80	45	75	40	70	65	80	60	80	45	75	-----	[3]	[3]	
Hilly phase	-----	-----	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	-----	-----	
Steep phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Masada loam, undulating phase	85	110	60	95	65	90	60	85	85	110	70	90	70	95	[3]	75	80	1
Masada cobbly loam, undulating phase	70	90	50	85	60	80	50	75	70	95	60	80	65	85	[3]	[3]	[3]	
Meadowville silt loam [9]	165	195	80	110	60	75	60	75	105	130	95	115	100	115	[3]	[3]	70	9
Meadowville silt loam, cobbly variant [9]	120	160	70	90	60	80	60	80	90	115	75	100	80	105	-----	[3]	65	
Meadowville loam [9]	160	190	85	115	65	80	65	80	100	130	95	115	95	115	70	90	70	1
Melvin silt loam [6 8]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Mixed alluvial land [6]	-----	[3]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	[3]	-----	-----	-----	
Montalto silt loam, undulating shallow phase	115	145	75	100	85	110	70	100	80	110	80	100	85	105	70	100	55	
Montalto stony silt loam:																		
Undulating shallow phase	95	125	60	95	75	100	65	95	75	100	70	90	75	100	60	85	[3]	
Rolling shallow phase	85	110	60	90	60	85	60	90	70	90	65	90	70	90	55	80	[3]	
Myersville silt loam:																		
Undulating phase	135	180	82	115	105	130	80	115	95	125	90	110	90	110	80	105	55	
Rolling phase	100	130	75	100	85	110	75	110	90	120	80	100	80	100	70	95	50	
Hilly phase	-----	-----	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	[4]	-----	
Eroded hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Myersville stony silt loam:																		
Undulating phase	90	115	65	90	80	100	70	100	80	110	75	95	70	95	60	85	40	
Rolling phase	80	105	55	80	70	90	60	90	70	90	65	85	60	80	50	75	[3]	
Steep phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	[3]	
Eroded steep phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Penn loam:																		
Undulating phase	70	105	55	85	60	95	50	75	70	95	55	85	60	95	[3]	[3]	40	
Rolling phase	-----	[3]	-----	[3]	-----	[3]	-----	[3]	[3]	[3]	-----	[3]	-----	[3]	-----	-----	-----	
Hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	[3]	-----	[3]	-----	[3]	-----	-----	-----	
Penn silt loam:																		
Undulating phase	80	115	70	100	65	105	55	85	75	100	60	90	70	100	60	85	[3]	
Eroded undulating phase	45	75	50	80	50	80	40	70	55	80	45	75	40	70	-----	-----	-----	
Rolling phase	-----	[3]	40	65	40	60	30	50	50	70	40	65	40	75	-----	-----	-----	
Eroded rolling phase	-----	[3]	40	65	40	60	30	50	50	70	40	65	40	75	-----	-----	-----	
Hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	[3]	-----	-----	-----	-----	-----	-----	-----	
Penn shaly silt loam:																		
Eroded undulating phase	45	75	50	80	50	80	40	70	50	75	40	70	40	70	-----	-----	-----	
Eroded rolling phase	-----	-----	-----	[3]	-----	[3]	-----	[3]	[4]	[3]	-----	[3]	-----	[3]	-----	-----	-----	
Eroded hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Eroded steep phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Penn cobbly silt loam:																		
Undulating phase	60	90	50	75	50	75	40	60	60	80	50	75	50	85	-----	-----	-----	
Rolling phase	-----	-----	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	[3]	-----	-----	-----	
Penn stony silt loam:																		
Eroded hilly phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Eroded steep phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	[3]	-----	-----	-----	-----	-----	-----	-----	
Readington silt loam, undulating phase	75	110	50	80	55	85	50	70	65	90	60	85	55	90	-----	[3]	[3]	
Robertsville silt loam	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Rocky land:																		
Rolling acidic rock phase	[5]	[5]	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	[5]	-----	[5]	-----	
Hilly acidic rock phase	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	

See footnotes at end of table.

TABLE 3.—*Productivity ratings for crops and pasture*—Continued

Soil	Corn (100=50 bu. an acre)		Wheat (100=25 bu. an acre)		Barley (100=40 bu. an acre)		Oats (100=50 bu. an acre)		Lespedeza hay (100=1.5 tons an acre)		Orchard-grass hay (100=2 tons an acre)		Mixed hay (100=2 tons an acre)		Alfalfa hay (100=4 tons an acre)		Potato (100=2 bu. an ac	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	
Rocky land—Continued																		
Rolling basic rock phase	[5]	[5]												[5]		[5]		
Hilly basic rock phase																		
Rohrersville silt loam [6]		[3]							[3]									
Rohrersville stony silt loam [6]		[3]								[3]		[3]		[3]				
Rowland silt loam [6 7]	105	145							85	100	65	85	75	90				
Sequatchie loam [9]	140	180	80	110	80	110	85	115	100	130	95	115	90	110	70	100	75	1
Stony colluvial land, rolling and hilly phases																		
Thurmont gravelly loam:																		
Undulating phase	95	130	75	100	80	105	70	100	80	110	80	100	75	95	60	90	70	
Rolling phase	85	120	70	95	75	95	60	90	70	100	75	95	70	90	50	85	60	
Thurmont cobbly loam:																		
Undulating phase	90	120	60	85	65	85	65	90	70	95	75	100	70	95	35	65	[3]	
Rolling phase		[3]		[3]		[3]		[3]		[3]		[3]		[3]		[3]		
Trego gravelly silt loam [6]	55	90	40	70	45	70	45	75	70	95	40	65	50	70				
Unison silt loam:																		
Undulating phase [9]	115	145	65	90	80	105	75	110	80	110	80	100	85	105	65	95	55	
Rolling phase	110	140	60	85	75	100	70	105	75	105	75	95	80	100	60	90	50	
Unison stony silt loam:																		
Undulating phase	100	130	55	80	70	90	70	100	75	100	70	95	75	100	40	70	[3]	
Rolling phase		[3]		[3]		[3]		[3]		[3]		[3]		[3]		[3]		
Very rocky land:																		
Acidic rock phase																		
Basic rock phase																		
Wehadkee silt loam [6]																		
Whiteford silt loam:																		
Undulating phase	95	130	80	105	75	100	75	100	90	120	75	100	70	90	65	90	45	
Rolling phase	75	100	70	95	60	85	60	85	80	100	70	95	65	95	55	80	40	
Hilly shallow phase				[3]		[3]		[3]	[3]	[3]		[3]		[3]				
Whiteford stony silt loam:																		
Rolling phase																		
Hilly phase				[3]		[3]		[3]		[3]		[3]		[3]				
Wickham loam	140	180	80	110	100	125	85	115	100	130	90	110	100	115	80	105	70	
Worsham silt loam [6 8]																		

[1] Ratings are for mature orchards.

[2] Cow-acre-days is the number of days a mature animal (cow, horse, or steer) can graze 1 acre without injury to the pasture.

[3] The crop is not commonly grown, but the soil is considered physically suited to it.

[4] Smoother, less eroded areas can be used for permanent pasture under careful management.

[5] In places, a little corn and hay, including alf rock outcrops.

[6] Ratings are for undrained areas.

[7] Periodic flooding reduces the average yields.

[8] This soil will produce corn and some hay crops

[9] Lodging reduces yields of small grain in wet sea

[10] Smoother, less stony areas furnish a little grazi

Engineering Properties of Soils

This soil survey report of Loudoun County, Va., contains information that can be used by engineers to (1) select sites for buildings and other structures; (2) locate highways and airports; (3) locate sand and gravel for construction use; (4) install septic tanks for sewage disposal; (5) locate sanitary fills; (6) determine the suitability of soils for traffic; and (7) plan dams, ponds, and other structures for flood control and soil and water conservation.

The soil maps and the accompanying report are too generalized for some engineering purposes. They are valuable, however, in planning detailed field surveys and tests to determine the in-place condition of the soil at the site of the proposed engineering construction. After testing the soil materials and observing the behavior of soils under varying conditions, the engineer can anticipate with fair accuracy the properties of the soil units on the maps.

Engineering Data

Some of the information that engineers need to know about Loudoun County soils is given in table 4. This table lists some of the in-place properties of the soils. The table was prepared mainly for use in agricultural engineering, but it can be used in other engineering fields. Other information can be obtained from the soil maps, the soil association map, and two sections of the report: (1) The Soils of Loudoun County and (2) Genesis, Morphology, and Classification of Soils.

Information about the texture and parent materials of soils is useful in locating materials for construction. Soil materials that are high in silt and clay particles are very susceptible to frost action. Coarse-grained materials are less susceptible to frost action and are, therefore, more suitable for use in the upper part of subgrades and for pavement foundations.

It is important to know the location of poorly drained soils when building roads. Such soils, especially those high in organic matter, are severely limited for most construction. They should be bypassed for roadbuilding where feasible.

It is also important to know whether the clay in the soils is the swelling and expanding kind. Where cuts are made in poorly drained areas or where clay has high swelling characteristics, the excavated material should not be used as fill for embankments. Suitable fill from other areas should be used for embankments and for foundations below gradeline in the cuts. Swelling and expanding clay should not be used in fills or as roadbed material because it may expand and "blow the road."

Some soils in the county have rock fragments. These fragments make excavation difficult with some types of equipment. Also, they prevent the use of tamping rollers to compact materials that are placed in embankments. Large stone fragments must be crushed or removed, if stony soil material is used in foundations, pavements, and base courses for roads. However, the only soils that can be excavated in winter may be those with a high percentage of rock fragments and a shallow depth to bedrock.

Seepage along the backslope of cuts in wet soils may cause slumping or sliding of the overlying material. A perched water table beneath a road pavement may cause freezing and thawing in the saturated foundation material. This alternate freezing and thawing, in turn, causes differential volume changes and differences in bearing capacity. Such water tables occur in soils with fragipans like Belvoir and Captina. Poorly drained areas should be inspected in detail to determine the need for interceptor drains and underdrains.

Before installing septic tank drainage systems for areas that do not have trunk sewage, the percolation rate of the various soils must be determined. The percolation rate is directly affected by the texture, structure, parent material, kind and amount of clay, depth to hard, nonporous rock, and other soil characteristics.

A column in table 4 shows the suitability for septic tank drainage systems for representative soils in the county. This general rating is based on estimated percolation potentials (in inches per hour) below 28 inches in the various soils.

Two things are considered in determining the soil suitability for pond building: (1) The compactability of the soils and (2) the porosity of the underlying rock. Pond sites (fig. 6) are generally selected in drainageways or incipient drainageways; therefore, the recommendations on ponds concern the functions underneath the soil material and the kind of material available for building dams.

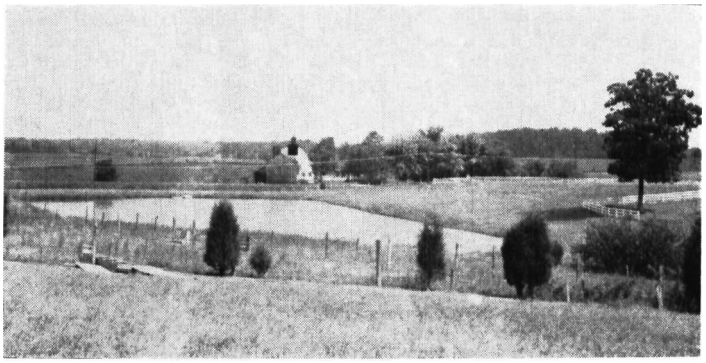


Figure 6.—**A farm pond in an area of Penn silt loam, undulating phase.**

TABLE 4.—*Properties of the*

Soil [1]	Depth [2]	Dominant texture	Permeability	Suitability as source of topsoil [3]	
				Surface soil	Subsoil
	Inches				
Airmont stony loam, hilly phase.	0–12	Loam	Rapid	Very poor	Very poor
	12–20	Sandy clay loam	Moderately rapid		
	20–38	Fine sandy loam	Rapid		
Athol silt loam, undulating phase.	0–14	Silt loam	Moderately rapid	Good	Very poor
	14–33	Clay	Moderate		
	33–65	Silty clay loam	Moderate		
Belvoir loam	0–11	Loam	Moderately rapid	Good	Poor
	11–38	Silty clay loam	Slow to very slow		
	38–45	Silt loam	Slow		
Bermudian silt loam	0–42	Silt loam	Moderately rapid	Very good	Very good
	42–60+	Fine sandy loam	Moderate to moderately rapid		
Bowmansville silt loam	0–10	Silt loam	Moderately rapid	Poor	Very poor
	10–40	Silty clay to silty clay loam.	Modearte to slow		
	40+	Stratified silt, sand, and gravel.	Moderate		
Braddock gravelly loam, undulating phase.	0–12	Silt loam	Rapid to moderately rapid	Poor	Very poor
	12–52	Silty clay loam	Moderate		
Brandywine loam and silt loam, rolling phases.	0–15	Loam	Rapid	Very good	Poor
	15–25	Weathered rock	Rapid		
Brecknock gravelly silt loam, undulating phase.	0–18	Silt loam	Moderate to moderately rapid	Very poor	Very poor
	18–34	Silty clay loam	Moderate		
	34–46	Silt loam	Moderate to moderately slow		
Buckingham stony fine sandy loam, rolling phase.	0–31	Fine sandy loam	Rapid	Poor	
Bucks silt loam, undulating phase.	0–7	Silt loam	Moderate	Good	Very poor
	7–42	Silty clay loam to clay	Moderate		
Calverton silt loam, undulating phase.	0–7	Silt loam	Moderately rapid	Poor	Very poor
	7–34	Silty clay loam	Slow to very slow		
	34–40	Silt loam	Very slow		
Captina silt loam	0–12	Silt loam	Moderately rapid	Good	Very poor
	12–60	Clay	Slow to very slow		
	60+	Silt loam	Slow		
Catlett gravelly silt loam, undulating phase.	0–7	Silt loam	Moderately rapid	Poor	Very poor
	7–14	Silty clay loam	Moderate to slow		
Catoctin silt loam, rolling phase.	0–15	Silt loam	Moderately rapid	Good	Very poor
Chester loam, undulating phase.	0–9	Loam	Rapid	Very good	Fair
	9–40	Sandy clay loam	Moderate		
	40–53	Partly weathered rock	Moderately rapid		
Chewacla silt loam	0–15	Silt loam with variable amount of mica.	Moderately rapid	Very good	Very good
	15–50		Moderate to moderately rapid		
Clifton stony silt loam, undulating and rolling phases.	0–8	Stony silt loam	Rapid	Poor	Very poor
	8–32	Silty clay loam	Moderate		
	32–68+	Silt loam	Moderate		

See footnotes at end of table.

soils important to engineering

Shrink-swell potential [4]	Kind of and approximate depth to bedrock	Depth to water table [5]	Suitability for—				Remarks
			Farm ponds	Septic tank drainage systems [6]	Irrigation [7]	Earthwork during prolonged wet periods	
		Feet					
Very low	5 feet to bedrock of quartzite and sandstone.	4; 90	Fair	Fair	Poor	Good	Stones 6 to 8 inches in diameter occupy 15 to 40 percent of the surface.
Moderate	6½ feet to limestone conglomerate.	([8]); 60	Poor	Good	Good	Fair	Much acreage has many limestone outcrops. Farm ponds may leak through underground caverns.
Low	8 feet to granodiorite	2; 50	Good	Very poor	Good (not needed).	Poor	Perched water table at 18 to 32 inches on top of fragipan horizon.
Low	8 feet to variable rock.	2; 15	Good	Poor	Good	Fair	Subject to overflow.
Low to moderate.	7 feet to variable bedrock.	½; ½	Good	Very poor	Poor (not needed).	Very poor (not suited).	Poorly drained; subject to overflow.
Moderate	15 feet to bedrock; old colluvial beds of greenstone and quartzite.	([8]); 60	Good	Good	Good	Fair	
Very low	5 feet to granodiorite	([8]); 40	Fair to poor	Good	Good	Good	
Low to moderate.	3 feet to baked shaly sandstone.	([8]); 55	Good	Fair	Good	Fair	
Very low	1½ to 3½ feet to quartzite and sandstone.	2; 65	Fair	Fair	Poor	Good	
Low to moderate.	3½ feet to sandstone conglomerate.	([8]); 55	Very good	Good	Good	Fair	This soil is a loam in places where formed from sandstone conglomerates.
Moderate	3 feet to shaly sandstone.	2; 50	Excellent	Poor	Fair	Poor	Perched water table in soil at 20 to 35 inches.
Moderate	10 feet to variable bedrock.	2; 20	Fair	Poor	Fair	Poor	Perched water table over fragipan at 18 to 30 inches.
Very low	1¼ feet to baked shale	([8]); 50	Fair	Fair	Fair	Good	Shale under soils is permeable in places.
Very low	1 to 2½ feet to chloritic greenstone.	([8]); 55	Fair	Fair to poor.	Fair	Good	Shallow and usually cobbly or stony.
Low	6 to 20 feet to granodiorite.	([8]); 60	Good	Very good	Very good	Good	20 to 30 feet deep over hard rock in places.
Low	10 feet to variable bedrock.	2; 2	Good	Very poor	Fair	Very poor	Subject to overflow.
Moderate	10 feet to chloritic greenstone schist.	([8]); 100	Fair	Fair	Fair	Poor	Accrues on mountain tops in most places.

TABLE 4.—*Properties of the soils*

Soil [1]	Depth [2]	Dominant texture	Permeability	Suitability as source of topsoil [3]	
				Surface soil	Subsoil
	Inches				
Congaree silt loam	0–42	Silt loam	Moderately rapid	Very good	Very good
	42–60+	Fine sandy loam	Moderate to moderately rapid		
Croton silt loam, level phase.	0–9	Silt loam	Moderately rapid	Very poor	Very poor
	9–34	Silty clay	Moderate to slow		
	34–42	Silt loam	Moderately slow		
Dyke cobbly silty clay loam, undulating phase.	0–7	Cobbly silty clay loam	Moderately rapid	Fair	Very poor
	7–45	Silty clay or clay	Moderate		
	45–70+	Silty clay loam	Moderately slow		
Elbert silt loam, level phase.	0–9	Silt loam	Moderate	Very poor	Very poor
	9–39	Clay	Very slow		
	39+	Coarse sandy loam	Slow		
Elioak silt loam, undulating phase.	0–7	Silt loam	Moderately rapid	Good	Fair
	7–32	Silty clay loam	Moderate		
	32–60+	Micaceous silt loam	Rapid		
Elk loam	0–7	Silt loam	Moderately rapid	Very good	Fair
	7–50+	Silty clay loam	Moderate to moderately slow		
Emory silt loam	0–14	Silt loam	Moderately rapid	Very good	Good
	14–25	Silty clay loam	Moderate to moderately rapid		
	25+	Silt loam	Moderate		
Eubanks loam, undulating phase. (This soil is not mapped separately but is part of the mapping unit called Eubanks-Chester loams and silt loams, undulating phases.)	0–9	Loam	Rapid	Very good	Fair to poor
	9–51	Sandy clay loam	Moderate to moderately rapid		
	51–66	Coarse sandy loam	Rapid		
Fauquier silt loam, undulating phase.	0–7	Silt loam	Moderately rapid	Fair	Poor
	7–24	Silty clay to clay	Moderate		
	24–34	Silty clay loam	Moderate		
	34–50+	Silt loam	Moderately rapid		
Glenelg silt loam, undulating phase.	0–7	Silt loam	Moderately rapid	Very good	Fair
	7–18	Silty clay loam	Moderate to moderately rapid		
	18–24	Silt loam	Moderately rapid		
	24+	Partly weathered micaceous material.	Rapid		
Hazel silt loam, rolling phase.	0–11	Silt loam, partly weathered phyllitic schist, some greenstone schist and arkosic sandstone.	Moderately rapid to rapid	Good	Very poor
Hiwassee loam, undulating light surface variant.	0–9	Loam	Rapid	Very good	Poor
	9–54	Ranges from sandy clay loam to silty clay to clay loam.	Moderate		
	54–126+	Gravel and cobbles	Moderate		
Huntington silt loam	0–50	Silt loam	Rapid	Very good	Very good
	50+	Silty clay loam	Rapid to moderate		
Iredell silt loam, undulating phase. (This soil is not mapped separately but is part of the mapping unit called Iredell-Mecklenburg silt loams, undulating phases.)	0–8	Silt loam	Moderate	Poor	Extremely poor
	8–28	Clay	Very slow		
	28–34	Coarse sandy loam	Slow		

See footnotes at end of table.

important to engineering—Continued

Shrink-swell potential [4]	Kind of and approximate depth to bedrock	Depth to water table [5]	Suitability for—				Remarks
			Farm ponds	Septic tank drainage systems [6]	Irrigation [7]	Earthwork during prolonged wet periods	
		Feet					
Low	10 feet to variable rock.	2; 15	Good	Poor	Good	Fair	Subject to overflow.
Moderate	4 feet to sandstone and shale.	1; 1	Good	Very poor	Fair (not needed).	Very poor	Subject to seepage in many places.
Moderate to high.	10 feet to greenstone.	(8); 70	Fair to good.	Good to fair.	Fair to good	Poor	
Very high	4 feet to diabase or syenite.	1; 1	Poor	Very poor	Poor (not needed).	Very poor	Subject to seepage in many places.
Low	15 feet to quartz sericite schist.	(8); 60	Fair to poor.	Good	Very good	Good	
Low to moderate.	12 feet to variable rock.	3; 20	Fair	Good	Very good	Good	
Low	10 feet to limestone conglomerate.	3; 10	Fair to poor.	Fair	Good	Fair	Sublayers range to silty clay.
Low to moderate.	10 feet to granodiorite.	(8); 60	Good	Good	Very good	Good	Sublayers range to silty clay loam and silty clay.
Moderate	5 feet to greenstone	(8); 65	Good	Fair	Good	Fair	Subsoils are fairly thin in most places.
Low	50 feet to quartz sericite schist.	(8); 50	Fair to poor.	Good	Very good	Good	
Very low	3 feet to phyllitic schist; some greenstone schist and arkosic sandstone.	(8); 60	Fair	Fair	Fair	Good	Very variable parent materials of arkosic sandstone, greenstone schist, and acid schist or phyllites.
Moderate	20 feet to shaly sandstone and shale.	(8); 50	Good	Good	Good	Fair	
Low	12 feet to sand or gravel.	3; 14	Fair	Poor	Good	Fair	Subject to overflow.
Very high	4 feet to diabase	2½; 35	Poor	Very poor	Fair	Very poor	Not much water in rock materials underneath the soil.

TABLE 4.—*Properties of the soils*

Soil [1]	Depth [2]	Dominant texture	Permeability	Suitability as source of topsoil [3]	
				Surface soil	Subsoil
	Inches				
Kelly silt loam, undulating phase.	0–8	Silt loam	Moderate	Fair	Extremely poor
	8–18	Silty clay loam	Slow		
	18–32	Clay	Very slow		
	32+	Clay loam	Very slow		
Legore silt loam, undulating shallow phase.	0–12	Silt loam	Rapid	Good	Very poor
	12–20	Silt loam to sandy loam	Moderately rapid to rapid		
Lindside silt loam	0–10	Silt loam	Moderately rapid	Very good	Fair (very poor below 60 inches).
	10–60	Silty clay loam	Moderate to slow		
	60+	Sandy or gravelly material.	Moderately rapid		
Manassas silt loam	0–36+	Silt loam to silty clay loam.	Moderately rapid to moderately slow.	Very good to fair.	
Manor silt loam, rolling phase.	0–6	Micaceous silt loam	Moderately rapid to rapid	Very good	Fair to good
	6–19	Micaceous loam	Rapid		
	19–50+	Partly weathered schist	Rapid		
Masada loam, undulating phase.	0–28	Loam	Moderately rapid	Good	Fair
	28–36	Clay loam	Moderate		
	36–42	Sandy loam	Moderate		
	42+	Gravelly and cobbly material.	Moderate to moderately slow		
Meadowville silt loam	0–48	Silt loam to silty clay loam.	Moderate to rapid	Very good	Good
Mecklenburg silt loam, undulating phase. (This soil is not mapped separately but is part of the mapping unit called Iredell-Mecklenburg silt loams, undulating phases.)	0–14	Silt loam to clay loam	Moderate to moderately rapid	Fair	Very poor
	14–21	Clay	Rapid		
	21–31	Coarse sandy loam	Moderately slow		
Melvin silt loam	0–12	Silt loam	Moderately rapid	Poor	Very poor
	12–44	Silty clay loam	Moderate to slow		
	44+	Stratified sand, silt, and gravel.	Rapid		
Montalto silt loam, undulating shallow phase.	0–14	Silt loam	Rapid	Good	Fair
	14–26	Silty clay loam	Moderate to moderately rapid		
	26+	Coarse sandy clay loam	Rapid		
Myersville silt loam, undulating phase.	0–7	Silt loam	Moderately rapid	Good	Fair
	7–21	Silty clay loam	Moderate		
Penn loam, undulating phase.	0–7	Loam to fine sandy loam	Moderately rapid	Fair	Fair to poor
	7–14	Loam to silt loam	Rapid		
	14–27	Sandy loam with sandstone fragments.	Rapid		
Readington silt loam, undulating phase.	0–7	Silt loam	Moderately rapid	Fair	Very poor
	7–21	Silty clay loam	Moderately slow		
	21–32	Shaly sandstone fragments and silt.	Very slow		
Robertsville silt loam	0–12	Silt loam	Moderately rapid	Very poor	Very poor
	12–42	Silty clay	Moderately slow to very slow		
Rohrersville silt loam	0–10	Silt loam	Moderately rapid	Good	Very poor
	10–30+	Silty clay	Moderate to slow		

See footnotes at end of table.

important to engineering—Continued

Shrink-swell potential [4]	Kind of and approximate depth to bedrock	Depth to water table [5]	Suitability for—				Remarks
			Farm ponds	Septic tank drainage systems [6]	Irrigation [7]	Earthwork during prolonged wet periods	
		Feet					
Very high	4½ feet to diabase and baked shale.	2½; 50	Poor	Very poor	Fair	Very poor	Hard impervious rock underneath soil at shallow depths.
Very low	20 inches to diabase and syenite.	1½; 50	Fair	Fair	Fair	Good	Highly stratified soil.
Low	10 feet to variable rock.	1½; 1½	Fair	Very poor	Fair	Very poor	Subject to overflow.
Low	4½ feet to variable rock.	3; 4	Good	Poor	Good	Poor	Texture of surface 12 inches ranges to fine sandy loam in places.
Very low	45 feet to quartz sericite schist.	(8); 60	Poor	Very good	Good	Very good	Weathered materials are very thick and highly micaceous and porous.
Low	18 feet to variable bedrock.	3; 50	Fair to good.	Fair	Good	Fair to good	
Low	8 feet to variable rock.	3; 6	Good	Poor	Good	Poor	Subject to seepage in places.
High	4 feet to diabase and syenite.	3; 40	Good	Very poor	Good	Poor	Hard impervious rock at shallow depth.
Moderate	8 feet to variable bedrock.	½; ½	Fair	Very poor	Not needed	Very poor (not suited).	Subject to overflow.
Low	4 feet to syenite-diabase dike rock.	(8); 50	Fair	Good	Good	Good	Very porous, permeable soil with fine structure.
Moderate	5 feet to greenstone	(8); 70	Good	Good	Good	Fair	
Very low	27 inches to arkosic sandstone.	3; 50	Good	Fair	Good to fair	Good	Some areas have shale or stone fragments throughout the profile.
Low	32 inches to shaly sandstone.	1½; 45	Good	Very poor	Fair	Poor	Underlain by horizontally bedded shale and shaly sandstone.
Moderate to high.	10 feet to variable rock.	1; 1	Fair	Very poor	Very poor (not needed).	Very poor (not suited).	Poorly drained on stream terraces.
Low to moderate.	15 feet to variable bedrock.	1½; 2	Good	Very poor	Poor (not needed).	Very poor (not suited).	Some concretions, gravels, and greenstone fragments.

TABLE 4.—*Properties of the soils*

Soil [1]	Depth [2]	Dominant texture	Permeability	Suitability as source of topsoil [3]	
				Surface soil	Subsoil
	Inches				
Rowland silt loam	0–10	Silt loam	Moderately rapid	Good	Very poor
	10–35+	Silty clay loam	Moderate to slow		
Sequatchie loam	0–11	Loam	Rapid	Very good	Fair to good
	11–36+	Fine sandy clay loam	Moderate to moderately rapid		
Thurmont gravelly loam, undulating phase.	0–8	Gravelly loam	Rapid	Poor	Poor to very poor.
	8–26	Silty clay loam	Moderate to moderately slow		
	26+	Angular quartz and greenstone gravel and stones.	Slow		
Trego gravelly silt loam	0–18	Gravelly silty clay loam	Moderately rapid	Fair	Very poor
	18–42	Sandy clay loam	Slow		
Unison silt loam, undulating phase.	0–8	Silt loam	Moderately rapid	Good	Poor
	8–50	Silty clay loam to silty clay.	Moderate to moderately slow		
	50+	Stony silty clay loam	Moderately slow		
Wehadkee silt loam	0–10	Silt loam	Moderately rapid	Poor	Very poor
	10–40	Silty clay to silty clay loam.	Moderate to slow		
	40+	Stratified silt, sand, and gravel.	Moderate		
Whiteford silt loam, undulating phase.	0–12	Silt loam	Moderately rapid	Good	Fair to poor
	12–20	Silty clay loam	Moderate		
	20–32	Partly weathered slate with silty material.	Moderate to moderately rapid		
Wickham loam	0–10	Loam	Rapid	Very good	Fair
	10–28	Clay loam	Moderate		
	28–50	Sandy clay loam with some gravel.	Moderate		
Worsham silt loam	0–15	Silt loam	Moderately rapid	Poor	Very poor
	15–50	Silty clay loam	Moderate to slow		
	50+	Silt loam with rock fragments.	Moderately rapid		

[1] Representative profile of each soil series; for series subject to erosion, the second layer of the described profile is generally the surface layer of the severely eroded phase.

[2] Profiles are divided into layers significant to engineers.

[3] For supporting vegetation; texture and organic matter are the chief determinants.

[4] Amount and kind of clay are the chief determinants.

The Soils of Loudoun County

This section points out some similarities and differences among the soils of the county and emphasizes those of significance to agriculture. The following quotation from The Soils That Support Us (*3*) discusses the need for classifying soils:

> In order to understand how the different soils may be best managed it is necessary to classify them. For centuries people have been using soils and finding out what uses are best for them. What is a good use for one may be a very poor use for another. One man may find that crops grow better if he adds lime to his soil, but a neighbor may find that it does not change his, whereas on a third soil it may even cause an injury. The same may be said of almost any farm practice. Terraces may reduce the amount of soil washed from sloping fields where the soil is permeable to water and yet may cause even more washing on others where the soil has a hard dense layer underneath.
>
> Not only are there different degrees of differences between soils, but also different kinds of differences between them. First, there are those differences due to local variations in parent rock, slope, or age. These are the ones with which many of us are most familiar. Our garden is sandy but our neighbor's is a clay loam; one is nearly level, and the other is hilly; in one there are several different layers while in the other the soil is about the same from the top to several feet beneath; or one may be wet (and either mucky or salty) while the other is well drained. Secondly, there are those differences due to climate and vegetation. From the same rocks, on the same well drained gentle slopes, a soil in Maine is light colored and acid, one in North Dakota is black and neutral (neither acid nor alkaline), one in Arizona is light colored and alkaline, and one in the tropics is red and acid. Then, we might add, there are some soils so young that no new features have developed, such as the fresh material just deposited by a stream, or the almost bare slopes of the mountains, or the dry, nearly sterile sand along the beach.

Soil Series and Their Relations

The soils of Loudoun County are classified in 55 series. In addition, there are 8 miscellaneous land types.

important to engineering—Continued

Shrink-swell potential [4]	Kind of and approximate depth to bedrock	Depth to water table [5]	Suitability for—				Remarks
			Farm ponds	Septic tank drainage systems [6]	Irrigation [7]	Earthwork during prolonged wet periods	
		Feet					
Low to moderate.	6 feet to variable rock.	2; 2	Fair	Very poor	Poor (not needed).	Poor	Subject to flooding.
Very low	15 feet to variable rock.	([8]); 10	Fair	Good	Very good	Good	Well drained on stream terraces.
Low	12 feet to variable bedrock.	([8]); 60	Good	Fair	Good	Good	Consists of colluvium. Some gravel throughout.
Low	8 feet to variable rock.	2; 15	Good	Very poor	Fair	Poor	Consists of colluvium.
Moderate to high.	10 feet to variable bedrock.	4; 40	Good	Fair	Good	Poor	Consists of colluvium.
Low to moderate.	8 feet to variable bedrock.	½; ½	Good	Very poor	Poor (not needed).	Very poor (not suited).	Poorly drained, subject to overflow.
Low to moderate.	3½ feet to phyllitic schist or slate.	([8]); 60	Good	Good	Good	Fair to good	
Low	10 feet to variable bedrock.	([8]); 15	Good	Good	Very good	Fair	
Low to moderate.	5 feet to granodiorite.	½; 1	Very good	Very poor	Poor (not needed).	Very poor (not suited).	Texture of subsoil is very variable.

[5] The first figure is the minimum depth to the water table during the wettest periods; the second figure is the approximate depth to the water table in the underlying rocks.

[6] Ratings are based on percolation rates per hour at 28-inch depth and are for the mapping unit or soil phase. Individual tests will need to be made on small building sites.

[7] For sprinkler systems; very little acreage is suitable for surface irrigation.

[8] No water table within the soil profile.

The series are classified as follows, according to topographic position: (1) Soils of the uplands, which are subdivided into those of the Blue Ridge, those of the Piedmont, and those of the Triassic Lowland of the Piedmont; (2) soils of the colluvial slopes; (3) soils of the stream terraces; and (4) soils of the bottom lands.

The uplands are those areas lying above the adjacent stream bottoms. In this county the soil materials of the uplands have developed directly from the weathering of the underlying rock.

The colluvial lands are on colluvial slopes in the uplands. They have developed from materials accumulated through creep, slide, or wash from the higher slopes.

The terrace lands are water-laid, benchlike deposits above normal overflow. They have a fairly smooth surface. In most places, the terrace lands are rather long, narrow areas bordered by stream bottoms on one side and by steeper sloping uplands on the other.

The bottom lands are first bottoms near streams. They are composed of waterborne material. The bottom lands are generally subject to flooding by adjacent streams.

The miscellaneous land types in the county have no true soil, because they have many rock outcrops, large quantities of stone, or mixed alluvial materials. Mixed alluvial land is one type. The others are all characterized by extreme stoniness or rockiness and include four phases of Rocky land, two phases of Very rocky land, and one phase of Stony colluvial land.

A key to the series is given in table 5. This table also shows the classification of the soils according to topographic position. The classes by soil slope gradient and their numerical limits are given in the Glossary at the back of this report under "Soil slope."

TABLE 5.—*Principal characteristics of the soil series*

Series	Parent material	General description of the profile [1]	Drainage [2]	Depth to bedrock	Do slop
		SOILS OF THE UPLANDS: BLUE RIDGE			
				Feet	
Buckingham	Residuum weathered mainly from— Quartzite and sandstone	Dark-brown fine sandy loam over brownish-yellow, friable fine sandy loam.	Excessive	1–3½	
Clifton	Chloritic greenstone	Dark-brown silt loam (stony) over yellowish-red, firm silty clay loam.	Good to somewhat excessive.	6–25	
		SOILS OF THE UPLANDS: PIEDMONT			
Belvoir	Residuum weathered mainly from— Granodiorite; some local alluvium included.	Yellowish-brown loam over yellowish-brown, grading to mottled, silty clay loam.	Somewhat poor to moderately good.	2–15	
Brandywine	Fine- to coarse-grained acidic and basic rock.	Brown silt loam to sandy loam over yellowish-brown loam or sandy loam.	Excessive	0–8	
Catoctin	Greenstone	Brown silt loam over weakly mottled, friable silt loam.	Excessive	0–2½	
Chester	Fine- to coarse-grained basic and acidic granodiorite and sheared granodiorite.	Brown loam over yellowish-red sandy clay loam.	Good	5–20	
Elioak	Fine-grained quartz sericite schist.	Brown silt loam over red, firm silty clay loam.	Good	4–30	
Eubanks	Fine- to medium-grained granodiorite.	Yellowish-brown loam to sandy loam over red, friable fine sandy clay loam.	Good	2–18	
Fauquier	Chloritic greenstone and greenstone schist.	Reddish-brown silt loam over red, friable silty clay.	Good	1–8	
Glenelg	Fine-grained quartz sericite schist.	Brown to dark-brown, friable silt loam over strong-brown to yellowish-red silt loam to friable silty clay loam.	Good	5½–100	
Hazel	Phyllitic slate, and some greenstone schist and arkosic sandstone.	Brown silt loam over mottled weathered schist.	Somewhat excessive to excessive.	1–5	
Manor	Fine-grained quartz sericite schist.	Brown silt loam over yellowish-brown, very friable, coarse loam.	Excessive	3½–90	
Myersville	Greenstone schist	Brown silt loam over yellowish-red, firm silty clay loam.	Good	0–8	
Whiteford	Fine-grained phyllitic slate	Brown silt loam over mottled, heavy silty clay loam.	Good	0–6	
		SOILS OF THE UPLANDS: TRIASSIC LOWLAND OF THE PIEDMONT			
Athol	Residuum weathered mainly from— Trap limestone conglomerate	Brown silt loam over reddish-brown firm silty clay to clay.	Good to somewhat excessive.	0–12	
recknock	Baked shaly sandstone, shale, and sandstone.	Grayish-brown silt loam over dark grayish-brown firm silty clay loam.	Good to moderately good.	1½–5	
Bucks	Sandstone conglomerate; some shaly sandstone, shale, and sandstone.	Reddish-brown silt loam over friable silty clay loam.	Good	2–5	
Calverton	Shale and sandstone	Brownish-yellow silt loam over yellowish-brown silty clay loam; mottled pan at 20 inches.	Somewhat poor to moderately good.	2–5	
Catlett	Baked shaly sandstone, shale, and sandstone.	Dark-gray gravelly silt loam over gray friable silt loam.	Excessive	½–1½	

Croton	Shale, shaly sandstone, and sandstone; some local alluvium.	Dominantly grayish-brown silt loam over mottled silty clay; more plastic with depth.	Poor	1½–8
Elbert	Syenite and diabase and other basic rocks; some local alluvium.	Light olive-brown silt loam over mottled plastic clay.	Poor	2½–10
Iredell	Diabase	Yellowish-brown silt loam grading to silty clay loam; yellowish-brown plastic claypan at 13 inches.	Moderately good	0–6
Kelly	Diabase and baked shale	Brownish-yellow silt loam over mottled very plastic clay (claypan).	Poor to moderately good.	2–8
Legore	Fine- to medium-grained diabase and syenite.	Dark reddish-brown silt loam over mingled red, brown, and yellow silty clay loam.	Somewhat excessive	0–3
Mecklenburg	Medium- to coarse-grained diabase.	Brown silt loam over yellowish-red plastic clay.	Moderately good to good.	0–6
Montalto	Medium- to coarse-grained diabase and syenite.	Brown silt loam over red, friable silty clay loam.	Good	0–7
Penn	Shale, sandstone, and shaly sandstone.	Yellowish-brown fine sandy loam to dark reddish-brown silt loam over mingled brown, yellow, and red loam to silt loam.	Good to excessive	0–4
Readington	Shaly sandstone, shale, and sandstone.	Strong-brown silt loam over dark-red and red silty clay loam.	Moderately good to good.	1⅓–4½
Soils of the Colluvial Slopes: Mountain Foot Slopes				
	Old colluvial materials chiefly from—			
Airmont	Quartzite and sandstone, and acid schist fragments; some moderately old.	Light brownish-gray loam over yellowish-brown fine sandy clay loam.	Good	2–12
Braddock	Greenstone, quartzite, and schist.	Yellowish-brown loam (gravelly) over red, grading to mottled, friable silty clay to clay.	Good	7–25
Dyke	Greenstone	Reddish-brown silt loam to silty clay loam over dark-red firm clay to silty clay.	Good	3½–25
Thurmont	Greenstone, quartzite, and acid schist.	Brown loam (gravelly) over yellowish-red and strong-brown silty clay loam to silty clay.	Moderately good to good.	7–25
Trego	Quartzite, acid schist, and greenstone.	Grayish-brown to brown silt loam (gravelly) over mottled silty clay loam to silty clay.	Somewhat poor	5–15
Unison	Greenstone	Brown friable silt loam over strong-brown to yellowish-red silty clay to clay.	Moderately good to good.	4–18
	Local alluvium mainly from—			
Emory	Limestone	Dark-brown silt loam over reddish-brown friable silt loam to silty clay loam.	Moderately good to good.	9–15
Manassas	Sandstone, conglomerate, and shale.	Reddish-brown silt loam over weakly mottled silty clay loam.	Moderately good to good.	2½–8
Meadowville	Greenstone, basic and acidic granodiorite, and mica schist.	Brown loam to silt loam over fine sandy clay loam to silt loam and silty clay loam.	Moderately good to good.	4–25
Rohrersville	Greenstone	Dominantly light-brown to grayish-brown silt loam over dominantly gray silty clay to clay.	Somewhat poor	5–40
Worsham	Acidic rock	Mottled silt loam over dominantly gray, plastic silty clay loam, clay loam, or sandy clay loam.	Poor	3–10

See footnotes at end of table.

TABLE 5.—*Principal characteristics of the soil series*—Continued

Series	Parent material	General description of the profile [1]	Drainage [2]	Depth to bedrock	Do slop
	SOILS OF THE STREAM TERRACES				
	Old general alluvium mainly from—				
Captina	Limestone and probably sandstone.	Grayish-brown silt loam over yellowish-brown silty clay loam grading to clay; mottled pan at 16 to 22 inches.	Somewhat poor to moderately good.	5–15	
Elk	Limestone	Brown loam to silt loam over strong-brown silty clay loam.	Good to moderately good.	8–30	
Hiwassee	Igneous and metamorphosed igneous rock.	Brown loam or fine sandy loam over dark-red firm clay or clay loam.	Good	6–35	
Masada	Igneous and metamorphosed igneous rock.	Very pale brown loam over yellowish-red, grading to mingled red and yellow, friable sandy clay loam.	Moderately good to good.	5–35	
Robertsville	Limestone	Dominantly gray silt loam over mottled, plastic silty clay or clay.	Poor	5–15	
Sequatchie	Shale, sandstone, and limestone.	Brown loam over yellowish-red friable loam to fine sandy clay loam.	Good	8–30	
Wickham	Igneous and metamorphosed igneous rock.	Brown loam to silt loam over reddish-brown friable clay loam.	Good	6–20	
	SOILS OF THE BOTTOM LANDS				
	Young general alluvium mainly from—				
Bermudian	Sandstone and shale	Reddish-brown silt loam over dark reddish-brown gravelly silt loam.	Good	4–12	
Bowmansville	Sandstone and shale	Grayish-brown silt loam over mottled, plastic silty clay loam.	Poor	3–11	
Chewacla	Crystalline rock	Brown silt loam over mottled, firm silt loam.	Somewhat poor to moderately good.	6–25	
Congaree	Igneous and metamorphosed igneous rock.	Brown loam to fine sandy loam over brown silt loam grading to sandier material.	Good	7–26	
Huntington	Limestone	Dark-brown silt loam grading to very dark grayish brown heavy silt loam.	Good	8–25	
Lindside	Limestone	Dark-brown silt loam over mottled, friable silt loam to silty clay loam.	Somewhat poor to moderately good.	6–20	
Melvin	Limestone	Mottled gray and brown silt loam over dominantly gray silty clay loam.	Poor	5–18	
Rowland	Sandstone and shale	Brown silt loam over mottled, friable silt loam to silty clay loam.	Somewhat poor to moderately good.	3½–10	
Wehadkee	Igneous and metamorphosed igneous rock.	Dominantly brown silt loam over mottled, plastic silty clay loam to silty clay.	Poor	5–20	

[1] The profiles described are not materially affected by erosion.

[2] A well-drained soil has good drainage; a moderately well drained soil has moderately good drainage.

[3] Profile development indicated by the number and contrast among horizons.

Soil Series, Types, and Phases

In the following pages, the soils and miscellaneous land types of the county are described, and their relation to agriculture is discussed. They are arranged alphabetically by series names and are identified by the same symbols as those used on the soil map.

The acreage and proportionate extent of each soil in the county are given in table 6.

TABLE 6.—*Acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Airmont stony loam:		
Hilly phase	1,951	0.6
Undulating phase	254	.1
Rolling phase	973	.3
Athol silt loam, undulating phase	1,440	.4
Athol gravelly silt loam:		
Undulating phase	805	.2
Rolling phase	862	.3
Athol rocky silt loam:		
Undulating phase	314	.1
Rolling phase	481	.1
Athol very rocky silt loam:		
Undulating phase	320	.1
Rolling phase	370	.1
Belvoir loam	5,686	1.7
Bermudian silt loam	185	.1
Bowmansville silt loam	2,506	.8
Braddock gravelly loam:		
Undulating phase	1,084	.3
Rolling phase	452	.1
Braddock cobbly loam:		
Undulating phase	325	.1
Rolling phase	237	.1
Brandywine loam and silt loam:		
Rolling phases	8,554	2.6
Hilly phases	6,127	2.0
Eroded hilly phases	509	.2
Steep phases	1,294	.4
Brandywine sandy loam:		
Rolling phase	1,453	.4
Hilly phase	1,384	.4
Steep phase	410	.1
Brandywine stony loam:		
Rolling phase	1,566	.5
Hilly phase	2,565	.8
Eroded hilly phase	216	.1
Steep phase	1,468	.4
Brandywine stony sandy loam:		
Undulating phase	22	(1)
Rolling phase	338	.1
Hilly phase	430	.1
Brecknock gravelly silt loam:		
Undulating phase	5,595	1.7
Rolling phase	351	.1
Buckingham stony fine sandy loam:		
Rolling phase	264	.1
Steep phase	448	.1
Bucks silt loam, undulating phase	3,585	1.1
Bucks cobbly silt loam:		
Undulating phase	2,044	.6
Rolling phase	756	.2
Calverton silt loam:		
Undulating phase	7,245	2.2
Level phase	606	.2
Captina silt loam	910	.3
Captina silt loam, high terrace phase	595	.2
Catlett gravelly silt loam:		
Undulating phase	1,999	.6
Rolling phase	732	.2
Catlett stony silt loam:		
Undulating phase	2,020	.6
Rolling phase	1,964	.6
Eroded rolling phase	634	.2
Hilly phase	780	.2
Catoctin silt loam:		
Rolling phase	709	.2
Hilly phase	1,752	.5
Catoctin silt loam—Continued		
Eroded hilly phase	110	(1)
Steep phase	445	0.1
Eroded steep phase	51	(1)
Catoctin stony silt loam:		
Rolling phase	179	.1
Eroded rolling phase	76	(1)
Hilly phase	1,366	.4
Eroded hilly phase	265	.1
Steep phase	1,534	.5
Eroded steep phase	920	.3
Chester loam, undulating phase	593	.2
Chester silt loam, undulating phase	457	.1
Chester loam and silt loam:		
Undulating phases	35,516	10.7
Rolling phases	8,051	2.4
Chester-Brandywine loams and sandy loams:		
Undulating phases	4,209	1.3
Rolling phases	2,242	.7
Chewacla silt loam	7,158	2.2
Clifton stony silt loam, undulating and rolling phases	395	.1
Congaree silt loam	1,152	.3
Congaree fine sandy loam	297	.1
Croton silt loam:		
Level phase	4,079	1.2
Undulating phase	4,376	1.3
Dyke cobbly silty clay loam:		
Undulating phase	903	.3
Eroded rolling phase	217	.1
Elbert silt loam:		
Level phase	3,401	1.0
Undulating phase	2,808	.8
Elbert stony silt loam, colluvial phase	1,153	.3
Elioak silt loam:		
Undulating phase	441	.1
Rolling phase	132	(1)
Hilly phase	27	(1)
Elk loam	310	.1
Emory silt loam	1,275	.4
Eubanks-Chester loams and silt loams:		
Undulating phases	8,565	2.6
Rolling phases	2,362	.7
Eubanks-Chester stony loams and silt loams:		
Undulating phases	3,877	1.2
Rolling phases	3,595	1.1
Hilly phases	523	.2
Fauquier silt loam:		
Undulating phase	720	.2
Rolling phase	332	.1
Hilly phase	53	(1)
Fauquier stony silt loam:		
Rolling phase	631	.2
Hilly phase	127	(1)
Fauquier silty clay loam:		
Eroded undulating phase	568	.2
Eroded rolling phase	651	.2
Eroded hilly phase	513	.2
Severely eroded rolling phase	20	(1)
Severely eroded hilly phase	24	(1)
Glenelg silt loam:		
Undulating phase	1,208	.4
Rolling phase	1,292	.4
Hilly phase	372	.1
Hazel silt loam:		
Rolling phase	354	.1
Hilly phase	780	.2

See footnote at end of table.

TABLE 6.—*Acreage and proportionate extent of the soils*—Continued

Soil	Area	Extent
Hazel silt loam—Continued	*Acres*	*Percent*
Steep phase	212	0. 1
Hiwassee loam, undulating light surface variant	150	(1)
Hiwassee cobbly loam:		
Undulating light surface variant	449	. 1
Rolling light surface variant	489	. 1
Huntington silt loam	1, 129	. 3
Iredell-Mecklenburg silt loams:		
Undulating phases	6, 590	2. 0
Eroded undulating phases	408	. 1
Rolling phases	475	. 1
Eroded rolling phases	478	. 1
Iredell-Mecklenburg stony silt loams, undulating and rolling phases	1, 838	. 6
Kelly silt loam:		
Undulating phase	3, 635	1. 1
Level phase	350	. 1
Legore silt loam:		
Undulating shallow phase	819	. 2
Rolling shallow phase	1, 078	. 3
Hilly shallow phase	148	(1)
Legore stony silt loam:		
Undulating shallow phase	345	. 1
Rolling shallow phase	651	. 2
Hilly shallow phase	331	. 1
Steep shallow phase	81	(1)
Lindside silt loam	731	. 2
Manassas silt loam	3, 497	1. 1
Manor silt loam:		
Rolling phase	518	. 2
Hilly phase	644	. 2
Steep phase	931	. 3
Masada loam, undulating phase	161	(1)
Masada cobbly loam, undulating phase	185	. 1
Meadowville silt loam	2, 818	. 9
Meadowville silt loam, cobbly variant	485	. 1
Meadowville loam	7, 861	2. 4
Melvin silt loam	514	. 2
Mixed alluvial land	717	. 2
Montalto silt loam, undulating shallow phase	1, 291	. 4
Montalto stony silt loam:		
Undulating shallow phase	49	(1)
Rolling shallow phase	235	. 1
Myersville silt loam:		
Undulating phase	3, 046	1. 0
Rolling phase	2, 888	1. 0
Hilly phase	528	. 2
Eroded hilly phase	90	(1)
Myersville stony silt loam:		
Undulating phase	2, 265	. 7
Rolling phase	3, 479	1. 1
Steep phase	1, 598	. 5
Eroded steep phase	614	. 2
Penn loam:		
Undulating phase	1, 967	. 6
Rolling phase	1, 398	. 4
Hilly phase	279	. 1
Penn silt loam:		
Undulating phase	12, 162	3. 7
Eroded undulating phase	451	. 1
Penn silt loam—Continued	*Acres*	*Percent*
Rolling phase	4, 587	1. 4
Eroded rolling phase	1, 831	. 6
Hilly phase	818	. 2
Penn shaly silt loam:		
Eroded undulating phase	221	. 1
Eroded rolling phase	1, 092	. 3
Eroded hilly phase	829	. 3
Eroded steep phase	416	. 1
Penn cobbly silt loam:		
Undulating phase	505	. 2
Rolling phase	661	. 2
Penn stony silt loam:		
Eroded hilly phase	594	. 2
Eroded steep phase	418	. 1
Readington silt loam, undulating phase	3, 308	1. 0
Robertsville silt loam	1, 075	. 3
Rocky land:		
Rolling acidic rock phase	2, 143	. 6
Hilly acidic rock phase	5, 324	1. 6
Rolling basic rock phase	6, 163	2. 0
Hilly basic rock phase	4, 936	1. 5
Rohrersville silt loam	886	. 3
Rohrersville stony silt loam	369	. 1
Rowland silt loam	2, 440	. 7
Sequatchie loam	427	. 1
Stony colluvial land, rolling and hilly phases	1, 027	. 3
Thurmont gravelly loam:		
Undulating phase	921	. 3
Rolling phase	218	. 1
Thurmont cobbly loam:		
Undulating phase	257	. 1
Rolling phase	369	. 1
Trego gravelly silt loam	982	. 3
Unison silt loam:		
Undulating phase	406	. 1
Rolling phase	95	(1)
Unison stony silt loam:		
Undulating phase	568	. 2
Rolling phase	319	. 1
Very rocky land:		
Acidic rock phase	5, 948	1. 8
Basic rock phase	5, 973	1. 8
Wehadkee silt loam	5, 378	1. 6
Whiteford silt loam:		
Undulating phase	432	. 1
Rolling phase	405	. 1
Hilly shallow phase	48	(1)
Whiteford stony silt loam:		
Rolling phase	140	(1)
Hilly phase	67	(1)
Wickham loam	292	. 1
Worsham silt loam	7, 831	2. 4
Subtotal	330, 052	99. 8
Made land	150	(1)
Mines and pits	10	(1)
Water	668	2
Total	330, 880	100. 0

[1] Less than 0.1 of the total area.

Airmont series

The Airmont series consists of well-drained stony soils that occur along the foot slopes of mountains and are underlain by quartzite and sandstone.

Airmont soils have a yellowish-brown to brown surface soil and a yellowish-brown, strong-brown, and brownish fine sandy clay loam subsoil. The parent material is mottled white, gray, brown, and yellowish sandy loam mixed with weathered sandstone and quartzite fragments of similar colors.

Airmont soils resemble those of the Thurmont series. The Airmont soils, however, are younger and have less deep and less strongly developed profiles and coarser textures. In addition, they have slightly darker colors in

the subsoil. They are more permeable and slightly more acid in reaction than the Thurmont soils. Thurmont soils were developed principally from mixed and acidic rock materials.

Airmont stony loam, hilly phase (Ac) (Capability unit VIIe-3).—This soil occurs on strongly sloping colluvial lands along the foot slopes of the Blue Ridge and Short Hill Mountains. It has developed from colluvial beds of quartzite and sandstone fragments mixed in a few places with schist and phyllite fragments. Loose stones are on 15 to 40 percent of the surface and are embedded in the profile. Most stones are 6 to 8 inches in diameter, but some are boulder size. This soil has rapid runoff and medium to rapid internal drainage.

Airmont stony loam, hilly phase, is associated with other Airmont soils, Rocky land (acidic phases), and Buckingham, Whiteford, Hazel, and Brandywine soils. It is in the Rocky land and Very rocky land, acidic rock phases-Airmont association.

Profile of this soil in a wooded area:

Surface soil—
1 to 0 inch, very dark gray to black, fluffy forest litter, partly decomposed; mostly reddish-brown oak and poplar leaves and twigs in top half.
0 to 2 inches, dark grayish-brown, very friable loam; moderate, fine, granular structure.
2 to 10 inches, light brownish-gray to yellowish-brown or brown, very friable loam; weak, fine to medium, granular structure; many loose quartz fragments and stones ½ to 10 inches across.

Subsoil—
10 to 13 inches, brownish-yellow, yellowish-brown, or light yellowish-brown, friable loam or light fine sandy clay loam; weak, fine, subangular blocky structure; faintly compact and platy in places in the lower part.
13 to 20 inches, yellowish-brown, friable to firm light sandy clay loam to sandy clay loam; weak to moderate, medium, subangular blocky structure; a few quartz gravel and stone fragments.

Underlying material—
20 to 38 inches, gravelly or gritty, very friable, fine sandy loam soil material; dominantly yellowish brown; some fine, faint mottles of strong brown, brown, and light yellowish brown; indefinite structure; pebbles, cobbles, and stones make up 50 to 75 percent of the soil mass.

The surface soil ranges from silt loam to fine sandy loam in texture and from dark grayish brown and brown to light yellowish brown in color. Small areas of Hazel, Whiteford, and Chester soils are exposed in places through the colluvium.

Airmont stony loam, hilly phase, is strongly acid and low in fertility. It contains a moderate quantity of organic matter. The soil is permeable and has a moderate capacity to hold water that plants can use. Because of the many stones, this soil is difficult to work.

Use and suitability.—Most of Airmont stony loam, hilly phase, is in forest. It is well suited to forest, although permanent pasture crops can be grown with careful management. Lime and complete fertilizers are generally needed for good pasture yields.

Airmont stony loam, undulating phase (Aa) (Capability unit IVs-3).—This soil is similar to Airmont stony loam, hilly phase, in color, structure, consistence, and stoniness, but it has smoother slopes and a deeper profile. It also has better available moisture-holding capacity and higher fertility in places. Runoff is slow to medium, and internal drainage is medium to rapid.

This soil is associated mainly with the hilly and rolling phases of Airmont stony loam. Most areas extend farther from the mountain slopes than the hilly phase. In addition, Airmont stony loam, undulating phase, has more granite, schist, and phyllite in the parent material and overlies Chester soils in many places.

Use and suitability.—More of this soil than of the hilly and rolling phases is used for pasture. Most of it, however, is in good trees that grow rapidly. Species include mainly yellow-poplar, white oak, red maple, walnut, and locust. Smoother slopes and better moisture-holding capacity make this undulating phase better suited to pasture and forest than the hilly and rolling phases. Simple grazing management is generally needed, as well as the addition of lime and complete fertilizers or fertilizers that contain mostly phosphate and potash.

Airmont stony loam, rolling phase (Ab) (Capability unit IVs-3).—Except for slope, this soil is similar to the undulating and hilly phases of Airmont stony loam. It has, however, a slightly shallower profile and less favorable water-holding capacity than the undulating phase. On the other hand, it has a deeper profile and, for the most part, more favorable characteristics than the hilly phase. Airmont stony loam, rolling phase, has rapid runoff and medium to rapid internal drainage.

Use and suitability.—Most of the acreage is in forest and pasture. Because of the rolling slopes and stoniness, cleared areas of this soil are best used for pasture. Grazing management similar to that used on Airmont stony loam, undulating phase, should be followed.

Athol series

The Athol series consists of soils derived from weathered products of conglomerate limestone.

The surface soil is brown to reddish-brown silt loam and gravelly silt loam to very rocky silt loam. The subsoil is reddish-brown to red firm clay or silty clay. The layer of parent material is variable in thickness and consists of yellowish-red to red and reddish-brown silty clay loam mixed with many yellow, white, yellowish-brown, and red weathered fragments of limestone conglomerate. The gravelly types of this series contain quartzite gravel that washed from mountain slopes.

Athol silt loam, undulating phase (Af) (Capability unit IIe-1).—This deep, reddish-brown, well-drained soil has developed over limestone conglomerate on uplands in the northeastern part of the county. Limestone sinks and conglomerate limestone outcrops are characteristics of the areas where this soil occurs. Runoff and internal drainage are medium. Areas of this soil are in the Athol-Emory soil association.

Profile in a cultivated area:

Surface soil—
0 to 8 inches, brown, very friable silt loam; moderate, medium, granular structure.

Subsoil—
8 to 14 inches, reddish-brown, friable silty clay loam; weak, fine to medium, subangular blocky structure.
14 to 33 inches, reddish-brown, firm clay or silty clay; moderate, medium to coarse, subangular blocky structure; a few white, yellow, and black highly weathered fragments of limestone conglomerate.
33 to 58 inches, dominantly yellowish-red, friable silty clay loam to clay with mottlings of white, black, yellow, yellowish brown, and red; weak, medium, subangular blocky structure.

Parent material—
58 to 65 inches, yellowish-red, friable silty clay loam soil material mixed with many yellow, white, yellowish-brown, and red weathered conglomerate fragments.

The surface soil ranges from light silt loam to silty clay loam in texture and from light brown to dark reddish brown in color. The thickness of the subsoil ranges from 14 to 80 inches but is generally about 50 inches. Some small areas of brown plastic soils occur south of Lucketts. Fairly large areas of redder soils are north of Lucketts. In these areas marble is present in the limestone rock materials. A few outcrops of limestone conglomerate and small areas of gravel occur in many places.

Athol silt loam, undulating phase, is strongly acid to neutral in the surface soil, strongly acid in the subsoil, and neutral to strongly acid in the parent material. It is higher in organic matter and natural fertility than its associated soils. It has moderate permeability and a high capacity to hold water that plants can use. It is easy to work and conserve.

Use and suitability.—Athol silt loam, undulating phase, is used principally for crops and pasture. It is one of the best soils in the county and highly productive of most local crops. Corn, small grain, clover, grass, and alfalfa produce good yields under simple management practices. The pasture vegetation is mostly bluegrass and whiteclover. Three- to five-year rotations do well and are used in many areas. Rotations 6 to 7 years in length, however, are not uncommon where orchardgrass is grown for seed. The use of lime, fertilizers, and manure and the turning under of crop residues are general practices. Lime is used for legumes, and small quantities give good results. This soil needs phosphate and potash.

Athol gravelly silt loam, undulating phase (Ad) (Capability unit IIe–1).—This soil differs from Athol gravelly silt loam, undulating phase, in having a thin surface mantle of old colluvial material—mainly of subangular quartz gravel. In some places the colluvial deposits are 12 to 18 inches thick and the soil resembles Braddock gravelly silt loam, undulating phase (not mapped in this county). In a few places, angular gravel originating from weathered conglomerate limestone occurs on the surface and in the profile, particularly near limestone outcrops.

Athol gravelly silt loam, undulating phase, is associated with Braddock, Thurmont, and Emory soils. Runoff and internal drainage are medium. A few limestone outcrops and quartz cobbles occur in places.

This soil is slightly more acid and is lower in organic matter and fertility than Athol silt loam, undulating phase. It is moderately permeable and has a high capacity to hold water that plants can use. It is well suited to most local crops.

Use and suitability.—Most of this soil is used for crops and pasture. The crops and management practices are similar to those on Athol silt loam, undulating phase. Most yields are slightly less, and good tilth is somewhat more difficult to maintain. This soil is suited to many kinds of crops and responds well to good management.

Athol gravelly silt loam, rolling phase (Ae) (Capability unit IIIe–1).—This soil is similar to Athol silt loam, undulating phase, but has stronger slopes and a somewhat shallower profile. Most slopes are 7 to 14 percent, but a few are 14 to 25 percent. Runoff is medium to rapid, and internal drainage is medium. This soil is more erodible than Athol gravelly silt loam, undulating phase, and some areas have lost much surface soil.

Use and suitability.—Most of Athol gravelly silt loam, rolling phase, is used for pasture and row crops. This soil, because of its stronger slopes, does not have as wide a range of use as the undulating phases of Athol soils. It produces slightly lower yields under similar management. The steeper areas (14 to 25 percent slopes) can be used best for permanent pasture. Careful management is needed if the more rolling areas are cultivated. Good management practices should include (1) using long rotations that emphasize sod crops, (2) planting alfalfa and other deep-rooted crops, (3) applying manure and turning under crop residues, (4) planting-and cultivating on the contour, (5) liming according to needs, and (6) maintaining a well-balanced, comparatively high level of fertilization.

Athol rocky silt loam, undulating phase (Ag) (Capability unit VIs–1).—Outcrops of conglomerate limestone bedrock occupy from 15 to 40 percent of the surface of this soil. These outcrops are a few inches to about 5 feet high. Many sinkholes occur. The soil between the outcrops is very similar to that of the undulating phase of Athol silt loam, but it is more variable in depth, subsoil development, and color. Areas near the outcrops are brown, granular, shallow soils that are generally neutral in reaction. The larger areas of soil between the rocks range from strongly acid to neutral. Runoff and internal drainage of this soil are medium. The maximum depth to bedrock is about 8 feet; the average depth is about 5 feet. Some areas have good bluegrass and whiteclover sod. Generally this soil is high in organic matter and fertility. It is associated with other Athol soils and Emory silt loam.

Use and suitability.—Most of this soil is in permanent pasture. It is well suited to this use. Good pasture management practices are mainly control of grazing, supplementary winter feeding on the pasture, and light applications of fertilizer in places.

Athol rocky silt loam, rolling phase (Ah) (Capability unit VIs–1).—This soil is similar to Athol rocky silt loam, undulating phase, except in slope. Bedrock occurs at the surface and to a maximum depth of 7 feet. The average depth is about 4 feet. Runoff is medium to rapid. Internal drainage is medium except where rock outcrops occur. This phase is more erodible and contains fewer sinkholes than the undulating phase.

Use and suitability.—Almost all of this soil is in permanent pasture, but some is used as woodlots. This soil requires the same management practices as the undulating phase of Athol rocky silt loam. Grazing should be more carefully controlled, however, and fertilizer applications should be slightly heavier.

Athol very rocky silt loam, undulating phase (Ak) (Capability unit VIIs–2).—This soil differs from Athol rocky silt loam, undulating phase, chiefly in having more rock outcrops. These outcrops, which protrude from a few inches to 10 feet above the surface soil, occupy from 40 to 90 percent of the area. The very small areas between the rock outcrops are mostly shallow, thinly developed, brown to reddish-brown silt loam and silty clay loam. Surface runoff is medium to rapid. Internal drainage is

medium to slow in the soil areas between the rock outcrops. The soil between the outcrops is higher in lime, organic matter, and natural fertility than the nonstony Athol soils, but it is droughty and very limited in use.

Use and suitability.—Most of this phase is in permanent pasture and is well suited to it. Because of the small surface area between the rock outcroppings, one steer requires from 6 to 8 acres for grazing. Use of phosphate fertilizer and regulated grazing are necessary on this soil. The rocks in some places are suitable for use as road material and for the production of lime.

Athol very rocky silt loam, rolling phase (Am) (Capability unit VIIs–2).—This soil is similar to Athol very rocky silt loam, undulating phase, in most characteristics but differs in slope. The slope gradients are generally 7 to 14 percent, but a few are 14 to 25 percent. Runoff is rapid to very rapid, and internal drainage is slow to medium. The maximum depth of the soil between the rocks is 3 feet; the average depth is about 1 foot.

Use and suitability.—Most of this soil is in permanent pasture. It is best suited to this use.

Belvoir series

The Belvoir series consists of somewhat poorly drained to moderately well drained soils that are characterized by a compact layer, or fragipan, in the subsoil. Belvoir soils occur in association with Chester soils on upland flats, at the heads of minor streams, and along drainageways.

The upper horizons and parent material of these soils resemble those of the Chester series. The Belvoir soils, however, are slightly lighter in color throughout the profile. The Belvoir surface soil is light-brown, yellowish-brown, and brown loam to silt loam. The subsoil is fine sandy clay loam to silty clay loam in the upper part. The lower part is a compact horizon, or fragipan, mottled with gray, strong brown, yellowish red, and yellowish brown. Because of slow internal drainage, these soils are best suited to pasture and to mixed hay crops, except alfalfa.

Belvoir loam (Bo) (Capability unit IIIw–1).—This poorly drained soil occurs on upland flats, in depressions at the head of drainageways, and at the foot of slopes. It has developed from weathered granodiorite. It is associated with Chester, Brandywine, Eubanks, Meadowville, and Worsham soils. It is between the Meadowville and Worsham soils in drainage and relief. Runoff is slow to medium, and internal drainage is very slow to slow. Except on wide upland ridge divides, most areas are small. This soil is in the Belvoir-Worsham-Chester soil association.

Profile in a cultivated area:

Surface soil—
0 to 7 inches, yellowish-brown, very friable loam; weak, fine, granular structure; weak, platy structure in the lower part in places.

Subsoil—
7 to 11 inches, pale-yellow to brownish-yellow, friable light fine sandy clay loam; weak, medium to fine, subangular blocky structure; faint mottles of gray in the lower part.
11 to 19 inches, brownish-yellow, friable clay loam or silty clay loam; medium to coarse, subangular blocky structure; medium to coarse, platy structure in the lower part in some places.
19 to 38 inches, firm, heavy, silty clay loam to heavy sandy clay hardpan; mottled strong brown, gray, light gray, and brownish yellow; strong, coarse, platy structure.

Parent material—
38 to 45 inches, friable silt loam soil material that contains many partly weathered granodiorite rock fragments; distinctly mottled dark brown, white, light gray, and gray.

This soil is 2 to 15 feet deep to bedrock but averages about 8 feet. The thickness of the surface soil ranges from 5 inches on upland flats to 18 inches in depressions. In most areas it is about 7 inches. The surface soil is generally lighter in color on upland flats. In these areas it is pale yellow to brown, mottled in places with light gray. The texture of the surface soil is loam and silt loam in most places, but it ranges from coarse sandy loam to heavy silt loam. The subsoil over the hardpan ranges from brownish yellow to yellowish red. Its texture ranges from heavy loam, fine sandy clay loam, and silt loam through heavy silty clay loam and clay loam.

The hardpan layer varies in texture, structure, and sequence of development. The thickness ranges from a few inches to 36 inches, but it is generally about 16 inches. In a few upland areas where the soil was derived from more basic soil materials, this soil has plastic claypans instead of hardpans.

The parent material of the Belvoir soil is generally highly mottled with shades of gray and brown. It consists of coarse sandy loam to clay soil material mixed with fragments of coarse-grained, acidic granodiorite and with fine-grained, sheared, basic granodiorite. In places the materials consist partly of colluvium that washed from upland soils.

Belvoir loam is strongly acid and rather low in organic matter and fertility. Permeability is moderately rapid in the surface soil and slow to very slow in the subsoil. The soil has a low to moderate capacity to hold water that plants can use but retains added plant nutrients well. Because of the hardpan and consequent slow drainage, Belvoir loam is fairly difficult to cultivate. It has a narrower range of use than its associated well-drained soils. This soil is difficult to work with heavy farm machinery, especially in wet seasons, because it dries slowly after rains. The soil area includes some small wet spots that resemble Worsham silt loam.

Use and suitability.—Belvoir loam is used chiefly for crops and pasture, and a small part is in forest. Rotations lasting 5 to 6 years are generally used. A common rotation is corn, 1 year; small grain, 1 year; hay, 1 year; and orchardgrass grown for seed, 2 to 3 years. This soil is suited to hay and pasture crops, such as ladino clover, fescue, and other moisture-tolerant plants. Many of the more nearly level and wetter areas are best suited to permanent pasture. Lime, complete fertilizer, and manure are needed on this soil.

Bermudian series

The Bermudian series consists of brown, well-drained soils on first bottoms in the Piedmont Lowland or Triassic Lowland of the county. These soils are very similar to Congaree soils in most characteristics. Bermudian soils, however, have parent material that has washed from soils of the Piedmont Lowland, contain less mica, and are shallower over bedrock. Only one soil of the Bermudian series is mapped in the county.

Bermudian silt loam (Bb) (Capability unit I–1).—This brown, well-drained soil has developed in recently deposited alluvium. It is associated with the Rowland and

Bowmansville soils, which have poorer drainage. Runoff is slow, and internal drainage is medium to rapid. Areas of this soil occupy higher positions than the associated soils of the bottom lands. They are subject to stream overflow. This soil is in the Rowland-Bowmansville-Bermudian soil association.

Profile in a cultivated area:

Surface soil—
0 to 22 inches, reddish-brown, very friable silt loam; weak fine to medium, granular structure.
Subsurface—
22 to 37 inches, reddish-brown, friable heavy silt loam; moderate, medium, subangular blocky structure; many rounded, red shale particles near the bottom of the layer.
Underlying material—
37 to 52 inches, dark reddish-brown, firm, very gravelly silt loam; some black concretions and yellow specks; contains gravel that is mostly red, rounded, shaly sandstone particles washed from the Triassic Lowland; gravel ranges from ⅛ to ½ inch in diameter and comprises about 80 percent of the soil mass.

The underlying material ranges in texture from silt loam to silty clay loam. Sandy and gravelly bars occur in some places near creek banks. Some areas near uplands have recent colluvial deposits. Small areas of Manassas silt loam are included with this soil.

Bermudian silt loam is medium to strongly acid and high in natural fertility and organic matter. The capacity to hold water that plants can use is high. Permeability is rapid in the surface soil and moderate to moderately rapid in the subsoil. The soil retains added plant nutrients well. This soil is not subject to erosion, but floodwaters deposit materials in places. The soil is easy to work and conserve and produces many crops under simple management.

Use and suitability.—This soil is used mainly for crops and permanent pasture. The acreage used for each is about equal. A small acreage is idle. Corn, hay, and some small grain are commonly grown on the cultivated areas. Permanent pastures are mainly of bluegrass and whiteclover. Short term rotations are used; some farmers grow corn for 2 years before planting hay or small grains.

Areas of this soil not frequently flooded are well suited to corn. Alfalfa, however, is short lived on this moist soil, and small grains lodge badly in wet seasons. The frequency of overflow determines whether an area can be cultivated successfully. Areas that flood frequently are best suited to permanent pasture.

Aside from flood control, there are few management problems. The soil can be used often for row crops. Small quantities of lime and of fertilizers that contain mostly phosphate and potash will keep this soil highly productive. Nitrogen will be needed if corn is grown continuously for several years.

Bowmansville series

The Bowmansville series consists of nearly level to level, poorly drained soils on first bottoms in the Piedmont Lowland or Triassic Lowland of the county. These soils are associated with Bermudian and Rowland soils and resemble the Wehadkee and Melvin soils. They are more acid in reaction than the Melvin soil. Only one soil of the Bowmansville series is mapped in the county.

Bowmansville silt loam (Bc) (Capability unit Vw–1).—This poorly drained soil occurs on first bottoms along major creeks. The profile is mottled throughout with shades of gray, brown, and red. This soil is subject to overflow and seepage and is wet most of the time. It has formed in alluvium washed from Penn, Bucks, Catlett, and Brecknock soils. It occupies low positions on the bottom lands, mostly at the base of slopes adjacent to the uplands. This soil occurs in the Rowland-Bowmansville-Bermudian soil association.

Profile in a pastured area:

Surface soil—
0 to 10 inches, grayish-brown, very friable silt loam faintly mottled with weak red, strong brown, light gray, and yellowish brown.
Subsurface—
10 to 25 inches, prominently mottled weak-red, pinkish-gray, strong-brown, gray, and red silty clay loam; slightly plastic to plastic.
Underlying material—
25 to 36 inches, prominently mottled weak-red, pinkish-gray, and gray silt loam to silty clay loam; slightly plastic to friable; mixed with many red, pinkish, and gray sandstone and shale particles; contains many pockets of quartz pebbles and sandy material; waterlogged.

The depth to gravel ranges from 3 to 11 feet but averages about 7 feet. The texture of the subsurface layer ranges from sandy loam to clay, but it is mostly silt loam and silty clay loam. Some areas have recent deposits of reddish-brown silt loam about 6 to 10 inches thick. Transitional areas between this soil and the Rowland and Bermudian soils are browner, less mottled in the subsurface layer, and slightly better drained.

Bowmansville silt loam is very strongly acid to medium acid. It has a low to moderate amount of organic matter and is medium to high in fertility.

Use and suitability.—Most of the acreage is in pasture or is idle. A small part is in woods and cultivated crops. This wet soil is difficult to cultivate. It will produce only a limited variety of crops; its best use is for permanent pasture. Pasture production is improved by drainage ditches. Ladino clover and fescue can be grown successfully where some of the surface water is drained and lime, phosphate, and potash fertilizers are used. Ditches or terraces near adjacent slopes will remove seepage water in many places.

Braddock series

The Braddock series consists of well-drained soils that have brown surface soil and red silty clay to clay subsoil. The parent material is mottled red, yellowish-brown, yellow, and strong-brown friable silty clay loam mixed with many weathered fragments of greenstone, mica schist, and quartzite. The Braddock soils resemble Dyke soils in drainage and position but have a lighter colored surface soil. Only the gravelly and cobbly types are mapped in the county.

Braddock gravelly loam, undulating phase (Bf) (Capability unit IIe–4).—This well-drained soil occurs on high colluvial lands along the eastern foot slopes of the Catoctin, Hogback, and Bull Run Mountains. It has developed from old colluvial beds of mixed greenstone schist, acidic schist, and quartzite materials. Runoff and internal drainage are medium. The subsoil resembles that of the Dyke series, but the surface soil is thicker, lighter colored, and coarser textured. This soil is associated with the Thurmont and Trego soils of the colluvial lands and with the Athol soils of the uplands. Areas of this soil are in the Braddock-Thurmont soil association.

Profile in a cultivated area:

Surface soil—
0 to 8 inches, yellowish-brown to brown, very friable gravelly loam to silt loam; weak, fine to medium, granular structure; many small pebbles.
Subsoil—
8 to 12 inches, yellowish-red, firm, heavy silt loam; moderate, fine, subangular blocky structure; crushes easily to moderate, medium to coarse, granular structure; many small pebbles.
12 to 40 inches, red, friable, heavy silty clay loam, slightly plastic to plastic when wet; strong, fine, subangular blocky structure; contains a few pebbles ¼ to ¾ inch in diameter.
40 to 47 inches, mingled red, reddish-yellow, and yellow, friable silty clay loam, slightly plastic when wet; weak, fine, subangular blocky structure; lower part has many quartz pebbles and yellow and reddish-yellow greenstone fragments.
Underlying material—
47 to 52 inches, beds of quartz, greenstone, and acidic schist fragments mixed with silty clay loam, clay loam, and clay material of various colors.

The color of the surface soil ranges from yellowish brown to dark reddish brown. The texture ranges from loam to clay loam. Most of the surface soil, however, is yellowish-brown to brown loam and silt loam with few to many pieces of gravel. A few quartzite cobbles occur locally. The subsoil ranges from yellowish-red and dark-red friable silty clay loam to firm clay that is plastic when wet. However, red silty clay loam dominates. The underlying colluvial beds are a few feet to 15 feet thick. The surface of a buried Athol soil is at depths of 20 to 30 inches in places. Some very small areas of Thurmont gravelly loam are included with this soil.

Braddock gravelly loam, undulating phase, is strongly acid to medium acid in reaction, medium in natural fertility and organic matter, and high in capacity to hold water that plants can use. Permeability is rapid to moderately rapid in the surface soil and moderate in the subsoil. The soil is easy to work and conserve.

Use and suitability.—Most of the acreage is used for corn, small grain, and hay crops. A small part is in permanent pasture and forest woodlots. This soil is well suited to most local crops and is highly productive under simple management. Short rotations are well suited. Lime is needed for legumes, and fertilizers containing mostly phosphate and potash are needed in a cropping system that includes legumes and the use of manure. If legumes and manure are not used, nitrogen will be needed, especially for corn and small grain.

Braddock gravelly loam, rolling phase (Bg) (Capability unit IIIe–8).—This soil has steeper slopes and a slightly shallower profile than Braddock gravelly loam, undulating phase. In addition, it is more erodible. Some areas have lost much surface soil, and a few have small gullies. Runoff is medium to rapid, and internal drainage is medium. This soil is associated with the same soils as Braddock gravelly loam, undulating phase.

Use and suitability.—Most of this soil is used for crops. However, it has more acreage in permanent pasture and forest than Braddock gravelly loam, undulating phase. Crops and management are essentially the same as for the undulating phase, but more control of erosion is needed because of the stronger slopes. The rotations should include less corn and more hay or small grain. Heavier applications of manure are necessary, and most areas need more lime and fertilizers. Contour cultivation and stripcropping are useful for control of erosion.

Braddock cobbly loam, undulating phase (Bd) (Capability unit IIIe–8).—This soil is similar to Braddock gravelly loam, undulating phase, but has enough loose cobbles and stones on the surface and in the profile to interfere greatly with cultivation. Cobbles occupy 15 to 50 percent of the surface and much of the profile. Runoff and internal drainage are medium.

Use and suitability.—This soil is used principally for pasture and intertilled crops, but forest and idle areas comprise a large acreage. Many cobbles make cultivation difficult. The soil is used for corn, small grain, and hay crops, but yields are less than on Braddock gravelly loam, undulating phase. Generally, the cobbles are loose and can be picked up.

Braddock cobbly loam, rolling phase (Be) (Capability unit IVs–3).—The profile is somewhat shallower than that of Braddock cobbly loam, undulating phase. Runoff is rapid to very rapid. Most slopes are 7 to 14 percent, but some are 14 to 25 percent.

Use and suitability.—This soil is used mostly for pasture and forest and is well suited to these uses. Lime, fertilizer, and grazing control are needed for permanent pasture.

Brandywine series

The Brandywine series consists of excessively drained, shallow soils on rolling, hilly, and steep relief. They have brown silt loam to sandy loam surface soil and a weakly developed subsoil or no true subsoil. Brandywine soils have parent material similar to that of the associated Chester soils. Most areas are well suited to pasture and hay crops.

Brandywine loam and silt loam, rolling phases (Bh) (Capability unit IVe–2).—These brown, somewhat excessively drained soils occur on narrow, sharply rolling ridgetops and shoulders of ridge crests in the Piedmont Upland area. They are associated with Chester loam and silt loam soils. The surface soil consists of loam and silt loam. The parent material of the Brandywine soils is made up of weathered products of fine-grained, sheared granodiorite and medium-grained granodiorite. The silt loam was derived from the fine-grained rock materials, and the loam from the medium grained. The parent materials and soil types generally are in narrow parallel strata and bands that extend from northeast to southwest. The soil types form an intricate pattern that cannot be mapped separately. Runoff is medium to rapid, and internal drainage is rapid.

Profile of Brandywine loam, rolling phase, in a cultivated area:

Surface soil—
0 to 7 inches, brown to yellowish-brown very friable loam; weak, fine, granular structure.
Parent material—
7 to 15 inches, brown, yellowish-brown, and brownish-yellow loam to sandy loam mixed with many small quartz and granodiorite fragments.
15 to 25 inches, mostly partially weathered granodiorite rock materials colored with shades of brown, yellow, red, gray, and white.

The silt loam type in this undifferentiated unit has slightly browner surface soil and is underlain by browner and slightly less acidic parent material.

The surface soil of this undifferentiated unit ranges from pale brown to dark brown in color and from fine sandy loam to heavy silt loam in texture. Depth to bedrock ranges from 2 to 8 feet but averages about 5 feet. A few rock outcrops, pieces of gravel, and cobbles occur. Small areas that have shallow surface soil and thin red subsoil occur locally. In places, 25 to 75 percent of the surface soil has been lost through erosion, and in these the gravelly and coarse-textured parent material is exposed. In places where the soils of this unit grade to Chester soils, a thin yellowish-brown friable loam to light silty clay loam subsoil has developed. A small acreage with slopes of 2 to 7 percent is included.

The soils of this mapping unit range from medium to very strongly acid, but they are strongly acid in most places (pH 5.0–5.7). Permeability is moderate to moderately rapid in the surface soil and rapid in the subsoil. The capacity to hold water that plants can use is moderate to low. The natural fertility and supply of organic matter are medium to low. The soil is easy to work, responsive to good management, and fairly productive of many locally grown crops.

Use and suitability.—Most of the acreage is cultivated or in pasture. Commonly used are 5- to 7-year rotations of corn, small grain, red clover, and orchardgrass. Orchardgrass, fescue, clovers, lespedeza, and permanent pasture grasses are well suited, and alfalfa can be grown successfully if high fertility is maintained. Careful management is needed to conserve these soils. Rotations should use a large proportion of legumes and grasses and fewer intertilled crops. Good practices include adding organic matter, returning crop residues, cultivating on the contour, stripcropping, and liming. The shallowness and rolling slopes make moisture retention a major limiting factor. Organic matter, lime, and fertilizers that contain phosphate and potash are especially needed.

Brandywine loam and silt loam, hilly phases (Bk) (Capability unit VIe–2).—This unit is somewhat similar to Brandywine loam and silt loam, rolling phases, but has stronger slopes, a slightly shallower profile, and slightly more erosion. Runoff and internal drainage are rapid, and the capacity to hold water that plants can use is low. Severely eroded spots are common, especially on the rounded ends of ridges where intertilled crops have been grown.

Use and suitability.—These hilly soils are mostly in permanent pasture. A few areas are in crops and forest, and a few are idle. Mainly because of their strong slopes and shallowness, these soils are most suitable for permanent pasture. Some areas, however, can be used for such hay crops as orchardgrass or mixed legumes and grasses. If grasses and legumes are grown, careful management is needed to establish cover quickly. Lime, complete fertilizers, and reseeding are generally needed to improve old pasture, and overgrazing should be avoided. The growth of pastures is restricted mainly by lack of enough water.

Brandywine loam and silt loam, eroded hilly phases (Bm) (Capability unit VIe–2).—This unit is similar to Brandywine loam and silt loam, hilly phases, but is more eroded. Sheet erosion has removed a large part of the surface soil in places, and some shallow and deep gullies occur. Runoff is greater than on the uneroded hilly phases and is rapid to very rapid. Internal drainage is rapid.

Use and suitability.—These soils are mainly in pasture or forest. Cropland and idle areas have a small total acreage. These eroded soils are suited to permanent pasture or forest. They require management practices similar to those of the hilly phases. However, more moisture and organic matter are needed for good production on these eroded hilly soils.

Brandywine loam and silt loam, steep phases (Bn) (Capability unit VIe–2).—These soils are steeper and slightly shallower over bedrock than Brandywine loam and silt loam, rolling phases.

Use and suitability.—The acreage is mainly in pasture and forest—the most suitable uses.

Brandywine sandy loam, rolling phase (Bo) (Capability unit IVe–2).—This moderately coarse textured, porous, excessively drained soil occurs on rolling and sloping relief in the Piedmont Upland. It developed from weathered products of coarse-grained acidic granodiorite. Runoff is medium to rapid, and internal drainage is rapid. This soil is associated with Chester, Eubanks, Meadowville, and Worsham soils. It occurs in the Eubanks-Chester and the Chester-Brandywine (loams and sandy loams) soil associations.

Profile in a cultivated area:

Surface soil—
0 to 8 inches, brown to yellowish-brown, very friable sandy loam; weak to moderate, fine, granular structure; many pieces of small quartz gravel.

Parent material—
8 to 35 inches, yellow to yellowish-brown and brownish-yellow, very friable coarse sandy loam; many small pieces of quartz gravel; a few loose stones are present in the upper part; the stones increase with depth.

The surface soil ranges in color from light yellowish brown to brown and in texture from loam to coarse sandy loam. In some smoother areas, a thin sandy clay loam subsoil has developed. Quartz gravel and a few stones occur in places on the surface soil. A few areas of red and brown silty soils that resemble Montalto and Catoctin soils are included with this soil.

Brandywine sandy loam, rolling phase, is strongly acid, low in organic matter, and low to medium in fertility. It has a low capacity to hold water that plants can use. Permeability of the surface soil and subsoil is rapid to very rapid, and added plant nutrients leach rapidly when the soil is fallow. Although it is moderately easy to work, this soil is difficult to conserve.

Use and suitability.—Most of the acreage is in crops and permanent pasture. Corn, small grain, and hay are commonly grown in 5- to 7-year rotations. This soil is more suitable for small grain and hay crops than for alfalfa and corn, because of its shallowness, coarse texture, and rather strong slopes. Orchardgrass, fescue, timothy, red clover, and lespedeza are well suited. The use of lime, complete fertilizer, long rotations that include sod crops, and large quantities of manure and crop residues are needed for high fertility and productivity. Stripcropping will help control erosion.

Brandywine sandy loam, hilly phase (Bp) (Capability unit VIe–2).—This soil is steeper and shallower than Brandywine sandy loam, rolling phase. Runoff and internal drainage are rapid. The soil is highly erodible and has lost much surface soil. A few deep and shallow gullies occur, as well as cobbles, stones, and some rock

outcrops. A small acreage of Louisburg sandy loam, hilly phase (not mapped in the county) is included. It has slightly lighter colored surface soil and parent material and was derived from weathered products of arkosic sandstone.

Use and suitability.—Most of the acreage of this soil is in pasture, forest, crops, and idle areas. Mainly because of its strong slopes and shallowness, this soil is most suitable for permanent pasture or forest. Liming, application of complete fertilizer and manure, grazing control, clipping of undesirable grasses and weeds, and reseeding will improve the pasture.

Brandywine sandy loam, steep phase (Br) (Capability unit VIe–2).—This soil occurs in deeply dissected uplands near large streams. It has steeper slopes (25 to 45 percent) and is slightly shallower than Brandywine sandy loam, hilly phase. Runoff is rapid to very rapid, and internal drainage is rapid. This soil is subject to severe erosion, and deep gullies have formed in some areas. It is associated with the Chester loams.

Use and suitability.—Most of the acreage of this soil is in pasture and forest—the most suitable uses. A very few areas are in crops. Management is similar to that for Brandywine sandy loam, hilly phase, but more care should be taken to control runoff and erosion.

Brandywine stony loam, rolling phase (Bs) (Capability unit IVs–1).—This soil differs from Brandywine loam and silt loam, rolling phases, in having coarser texture throughout and loose stones and angular cobbles on the surface and in the profile. Stones and cobbles make up 10 to 25 percent of the soil mass and limit cultivation. This soil contains more strips and spots of red soil than the nonstony types, and the underlying rocks contain less material from fine, sheared granodiorite. This soil occupies narrow, rolling ridgetops and ridge shoulders in the Piedmont Upland area and is associated with Eubanks, Chester, and Montalto soils. Areas of this soil are in the Eubanks-Chester and the Brandywine-Chester-Eubanks soil associations.

Use and suitability.—This soil is nearly all cleared for pasture and crops. Because of stones and coarse texture, it is less suitable for intertilled crops and permanent pasture than the nonstony types. It is fairly well suited to small grain and to most hay crops except alfalfa, and it is especially good for orchardgrass. Good practices are use of long rotations (mainly hay crops) and applications of lime, manure, and complete fertilizers. Manure, crop residues, and other organic matter are especially important to this soil. Permanent pastures consist mostly of bluegrass and whiteclover. The pastures require light applications of lime and of fertilizer that contains phosphate and potash.

Brandywine stony loam, hilly phase (Bt) (Capability unit VIs–4).—This soil has stronger slopes and is more shallow and more erodible than Brandywine stony loam, rolling phase. Runoff and internal drainage are rapid.

Use and suitability.—Most of this soil is in permanent pasture. A few areas are idle and a few are in woodlots. Hilly relief, shallowness, and stoniness make this soil difficult to work and to conserve. Its most suitable uses are permanent pasture and forest. Good pasture practices are liming the soil to a slightly acid reaction (pH 6.1 to 6.5), the use of fertilizers that contain mainly phosphate and potash, grazing control, and, in some areas, reseeding.

Brandywine stony loam, eroded hilly phase (Bu) (Capability unit VIs–4).—This soil is similar to Brandywine stony loam, hilly phase, but it has lost 25 to 75 percent of its surface soil through erosion and has some deep gullies in places. Runoff is very rapid, and internal drainage is rapid.

Use and suitability.—Most areas of this soil were once cultivated. These areas are now mainly idle or in permanent pasture. Some are reverting to forest. The less severely eroded areas are suitable for pasture. Severely eroded areas, however, are best suited to forest. Since this soil is highly erodible, it needs very careful management to prevent further damage. Many areas need to be reseeded for pasture.

Brandywine stony loam, steep phase (Bv) (Capability unit VIIs–1).—This soil is similar to the rolling and the hilly phases of Brandywine stony loam, but has steeper slopes, a shallower profile, and greater risk of erosion. A small acreage has been severely eroded. It occurs on steep ridge sides in deeply dissected areas along larger streams. Areas of this soil are in the Brandywine-Chester-Eubanks soil association.

Use and suitability.—Equal acreages of this soil are used for forest and pasture. Some areas are idle. Steep slopes and stoniness make the soil poorly suited to crops and limit its suitability for permanent pasture. However, careful management, including the intensive use of practices suggested for Brandywine stony loam, hilly phase, will produce fairly good pasture. Eroded and gullied areas are best suited to forest.

Brandywine stony sandy loam, undulating phase (Bw) (Capability unit IVs–1).—This soil is similar to Brandywine sandy loam, rolling phase, but it is stony and has milder slopes and a slightly deeper profile. Loose stones scattered over the surface and through the profile make up 15 to 50 percent of the soil mass. Runoff is medium, and internal drainage is rapid.

Use and suitability.—Most of the acreage is cultivated; the rest is in permanent pasture or idle. Cropping systems and other management practices are similar to those used on stony types of the Chester and other associated soils. Although this soil is rather difficult to work, it is suitable for a fairly wide variety of crops. Good management will produce fairly good yields of corn, small grain, clover, lespedeza, and grass. Some very stony areas are best suited to permanent pasture.

Brandywine stony sandy loam, rolling phase (Bx) (Capability unit VIs–3).—This soil is similar to Brandywine sandy loam, rolling phase, but loose stones occur on the surface and compose 15 to 50 percent of the soil mass. Outcrops of granodiorite bedrock protrude a few inches to as much as 3 feet above the surface of the soil. These outcrops seldom occupy more than 4 percent of the surface area.

Runoff is moderate to moderately rapid. Internal drainage is rapid and is slightly more rapid than in Brandywine sandy loam, rolling phase, but has similar variations.

Use and suitability.—The soil is mostly in permanent pasture and cutover forest. The generally poor to fair pastures consist mostly of orchardgrass, lespedeza, bluegrass, and whiteclover, as well as weeds, broomsedge, and wild grasses. Because of its stoniness, this soil is best suited to permanent pasture and forest. It is difficult to work, moderately low in natural fertility. and fairly

difficult to conserve. Good pasture management practices are the use of lime, complete fertilizer, and manure (or other organic matter); grazing control; clipping of undesirable herbage; and some reseeding.

Brandywine stony sandy loam, hilly phase (By) (Capability unit VIs–4).—This soil is similar to Brandywine sandy loam, hilly phase, but has stones and cobbles scattered over the surface and through the profile. The stones and cobbles make up 15 to 50 percent of the soil mass. Some granodiorite outcrops occur. Most slopes range from 15 to 25 percent, but a small acreage has slopes of more than 25 percent. Runoff and internal drainage are rapid, and cultivated soil is subject to severe erosion. Some deep gullies have formed on a few slopes of more than 25 percent.

Use and suitability.—Most of the acreage is in permanent pasture and forest. It is well suited to these uses. Pasture practices are similar to those suggested for Brandywine sandy loam, hilly phase. These practices are liming, application of complete fertilizer and manure, grazing control, clipping of weeds, and reseeding. The steep, more stony, eroded areas are best suited to forest.

Brecknock series

The Brecknock series consists of moderately well drained to well drained, fairly deep soils on undulating to rolling relief. They have a grayish-brown to dark grayish-brown silt loam surface soil and a dark grayish-brown fine sandy clay loam to silty clay and clay subsoil, generally mottled with strong brown and dark gray. The parent material is mottled dominantly with gray and brown. It is 6 to 20 inches thick and overlies hard-baked shale and sandstone. The Brecknock soils are gravelly throughout the profile.

Brecknock gravelly silt loam, undulating phase (Bzo) (Capability unit IIIe–4).—This light-colored, moderately well drained to well drained soil (fig. 7) was derived from weathered products of baked Triassic shaly sandstone, shale, and sandstone. It occurs on moderately low, wide upland ridgetops and mild slopes. Runoff is medium, and internal drainage is medium to slow. Sheet erosion is slight to moderate in most cleared areas, and some gullies have formed. This soil closely resembles Catlett gravelly silt loam, undulating phase, in color, but it is deeper over bedrock and its horizons are thicker. It is associated with the Catlett, Calverton, Croton, and Kelly soils.

Profile in a cutover wooded area:

Surface soil—
0 to 8 inches, very pale brown (dry), very friable, smooth silt loam; weak, fine, granular structure.

Subsoil—
8 to 18 inches, pale-brown (dry), friable silt loam; weak, medium, subangular blocky structure.
18 to 25 inches, dark grayish-brown (dry), firm silty clay loam; faint coatings of pink, black, and strong brown on the aggregates; strong, coarse, blocky structure.
25 to 34 inches, very dark grayish-brown, firm silty clay loam showing streaks of gray and specks of strong brown; weak, coarse, blocky structure to structureless (massive).

Parent material—
34 to 46 inches, very dark grayish-brown, friable silt loam to light silty clay loam; faintly mottled and streaked with gray, strong brown, and yellowish brown; many baked shaly sandstone particles in the lower part of the layer.

The color of the surface soil ranges from dark grayish brown to pale brown, but it is mostly yellowish brown and grayish brown. Some rock outcrops and some cobbles occur in places on the surface. Surface-soil texture ranges from gravelly silt loam to gravelly loam. The subsoil ranges from yellowish-brown friable silty clay loam to dark grayish-brown faintly mottled silty clay and clay. In places thin yellowish-brown and light olive-brown plastic clay horizons are immediately above the parent material. A few small wet spots are included. Also included are areas of Catlett gravelly silt loam, undulating phase, and soils that resemble Lehigh soils (not mapped in this county).

Figure 7.—**Profile of Brecknock gravelly silt loam, undulating phase. This soil is fairly well suited to all local crops.**

This soil is strongly to very strongly acid and moderately low in organic matter and natural fertility. However, it has a moderate capacity to hold water that plants can use and retains added plant nutrients. Permeability is moderate to moderately rapid in the surface

soil and moderately slow to moderate in the subsoil. This soil is fairly easy to work and to conserve.

Use and suitability.—Most areas of this soil are cultivated. Some of the acreage is in pasture, in cutover forest, and idle. A common rotation is corn and small grain, followed by several years of hay crops. Although alfalfa is grown on a few farms, it is not very well suited in many places.

This soil is fairly well suited to all local crops but is best suited to small grain and to all hay crops except alfalfa. Enough lime to raise the pH to a desirable level, as well as fairly heavy applications of most plant nutrients, are needed to produce good yields. This soil responds well to manure and crop residues.

Brecknock gravelly silt loam, rolling phase (Bzb) (Capability unit IIIe-5).—This soil has a slightly shallower profile than Brecknock gravelly silt loam, undulating phase. Runoff is rapid, and internal drainage is medium. This soil is more erodible than the undulating phase, and a few shallow gullies have formed. Gravel is generally more common than in the undulating phase.

Use and suitability.—Most of the acreage of this soil is in crops or pasture. Idle and forested areas make up a small part. Management is similar to that for Brecknock gravelly silt loam, undulating phase. Practices that help control erosion are contour cultivation, stripcropping, and use of long rotations that include mainly close-growing crops.

Buckingham series

The Buckingham series consists of shallow, excessively drained, hilly to steep soils. They have developed from weathered products of quartzite and sandstone. They have a yellowish-brown to dark-brown surface soil and a weakly developed, brownish-yellow fine sandy loam subsurface layer. The parent material is brownish-yellow fine sandy loam mixed with weathered quartzite and sandstone gravel, cobbles, and stones. Only the stony types are mapped in this county.

Buckingham stony fine sandy loam, rolling phase (Bzc) (Capability unit VIs-3).—This stony soil occurs in small widely scattered areas on the top of the Blue Ridge. It has developed from weathered products of quartzite and sandstone. It resembles Muskingum soils (not mapped in this county) but was derived from different parent materials. Runoff is medium to rapid, and internal drainage is rapid. The stones on the surface and in the profile hamper cultivation. The natural vegetation is mainly second-growth hardwoods, chiefly oak and hickory. Virginia pine generally grows in areas that have been clear cut. This soil is associated with the Airmont soils. It is in the Rocky land and Very rocky land, acidic rock phases—Airmont soil association.

Profile in a wooded area:

Surface soil—
0 to 4 inches, dark-brown to brown, very friable fine sandy loam; top inch is very dark gray; strong, medium to coarse, granular structure; many coarse angular and subangular quartzite and other rock fragments.

Subsurface—
4 to 13 inches, brownish-yellow fine sandy loam; weak, fine to medium, subangular blocky structure; crushes easily to moderate, medium, granular structure; angular and subangular rock fragments are plentiful.

Parent material—
13 to 31 inches, brownish-yellow, friable fine sandy loam mixed with many angular and subangular rock fragments from 2 to 12 inches in size.
31 inches +, bedrock.

The color of the surface soil ranges from yellowish brown to dark brown. The texture ranges from loam to gravelly sandy loam, but, in most places, it is fine sandy loam. The depth of this soil to bedrock ranges from 1½ to 3½ feet but averages about 1¾ feet. In some smoother areas, which resemble Edgemont soil (not mapped in the county), a thin subsoil has formed. Some outcrops of bedrock occur. Small areas with undulating relief are included.

This soil is very strongly to strongly acid, low in organic matter and natural fertility, and moderately to highly erodible. It does not retain added plant nutrients and has a very low to low capacity to hold water that plants can use. Stones, cobbles, and shallowness make this soil difficult to work and to conserve and also limit the number of crops that can be grown.

Use and suitability.—Nearly all of this soil is in forest; a very small part is in pasture. Permanent pasture and forest are the most suitable uses for this soil. Many areas that are isolated by very rocky soil are suitable for forest only. Good pasture practices are the use of lime, essential plant nutrients, manure, crop residues, and other organic matter.

Buckingham stony fine sandy loam, steep phase (Bzd) (Capability unit VIIe-3).—This soil occurs on the steep sides of mountains and on strongly sloping mountaintops and ridges. It is very similar to Buckingham stony fine sandy loam, rolling phase, but has stronger slopes and is more shallow. Runoff and internal drainage are rapid. This soil is more erodible than the rolling phase, and some shallow and deep gullies have formed.

Small areas of Buckingham stony fine sandy loam, hilly phase (14 to 25 percent slopes), are included with this steep soil because of their similarity and small extent. The hilly phase is not mapped separately in the county.

Areas of Buckingham stony fine sandy loam, steep phase, are in the Rocky land and Very rocky land, acidic rock phases—Airmont soil association.

Use and suitability.—Most of this soil is in forest, chiefly cutover hardwoods. The rest is idle or in pasture. Pastures consist mostly of wild grasses and weeds but have some spots of bluegrass, whiteclover, and lespedeza. Most pasture is not limed or fertilized or very heavily grazed. Some areas once cleared and cultivated have grown up in almost pure stands of Virginia pine.

The steep slopes and shallowness limit the crops that can be grown. This soil is well suited to forest. However, fair pasture can be grown with difficulty on some areas.

Bucks series

The Bucks series consists of well-drained, moderately deep to deep, well-developed soils on undulating relief. The surface soil is brown to reddish-brown silt loam to loam, and the subsoil is red silty clay loam to clay. The soils were derived from weathered products of sandstone conglomerate in most places and from some shaly sandstone, shale, and sandstone. Bucks soils resemble the Penn soils in color and parent material.

Bucks silt loam, undulating phase (Bzg) (Capability unit IIe-2).—This red, well-drained soil occupies smooth upland ridgetops and mild slopes in the Triassic Lowland of the county. It has formed from weathered products of sandstone conglomerate and shaly sandstone. Runoff and internal drainage are medium. Areas of this soil that were developed from sandstone conglomerate are large and occur mostly south of Leesburg. Areas that were developed mainly from shaly sandstone and siltstone are comparatively small and are widely scattered over the Triassic Lowland. This soil resembles the Penn soil in color but has a well-developed silty clay loam to clay subsoil and is deeper over bedrock. It is associated with Penn, Manassas, Readington, Calverton, and Croton soils. Areas of this soil are in the Bucks-Penn-Calverton soil association.

Profile in a cultivated area:

Surface soil—
0 to 7 inches, reddish-brown to brown, very friable silt loam; moderate, fine to medium, granular structure.

Subsoil—
7 to 12 inches, yellowish-red, friable, light silty clay loam; moderate, fine to medium, subangular blocky structure.
12 to 28 inches, red to reddish-brown, friable silty clay loam; strong, medium, subangular blocky structure; extremely weathered particles of sandstone conglomerate in the lower part.

Parent material—
28 to 42 inches, dominantly reddish-brown silty clay loam mottled with dark gray, light red, and yellowish brown; many reddish-brown, dark-gray, light-red, and yellowish-brown particles of sandstone conglomerate.

The depth of this soil to bedrock ranges from 2 to 5 feet but averages about 3½ feet. The depth is greatest over the sandstone conglomerate. Angular gravel and a few cobbles occur in spots. The thickness of the subsoil ranges from 6 to 30 inches but is about 20 inches in most places. The surface soil ranges from yellowish brown to dark reddish brown in color and from loam to silty clay loam in texture. Areas of this soil that are near the Athol soils are influenced by limestone material, have a finer textured subsoil than normal, and, in a few places, have outcrops of limestone conglomerate. Areas that adjoin Readington and Calverton soils have slower internal drainage than normal. A few areas of Bucks silt loam, undulating phase, along Route No. 15, south of Leesburg, are underlain by schist conglomerate. The areas of this soil underlain by sandstone conglomerate are the most fertile and have the best relief and tilth. All areas, however, are easy to work.

Bucks silt loam, undulating phase, is medium to very strongly acid, low to medium in natural fertility and organic matter, and slightly to moderately erodible. It has a high capacity to hold water that plants can use and retains added plant nutrients. Permeability is moderately rapid in the surface soil and moderate in the subsoil.

Small areas of Bucks loam, undulating phase, and Bucks silt loam, rolling phase (not mapped separately in the county), are included with this soil because of their similarity to it in most physical properties. Other small inclusions are areas of a Wadesboro soil (not mapped in the county), which have a lighter colored surface soil and subsoil, and small areas of Penn and Readington soils. The inclusions of the Penn and Readington soils occur principally in areas of Bucks silt loam, undulating phase, that are underlain by shaly sandstone.

Use and suitability.—Most of the acreage of this soil is in crops, pasture, and idle land. The principal crops are corn, small grain, mixed hay, and alfalfa. Crop rotations lasting 4 to 6 years are generally used; hay is usually followed by corn, and corn by small grain. Some orchardgrass is grown for seed. Mixed hay crops consist of orchardgrass, timothy, redtop, ladino clover, red clover, and lespedeza. In longer rotations, the hay crops are grazed the last 2 or 3 years before planting corn. Alfalfa generally follows corn and is grown as long as the stand is good.

This soil is well suited to most local crops. The acidity of the soil limits yields. From 2 to 3 tons of lime per acre are needed for such legumes as alfalfa and clovers. If nitrogen is supplied through legumes or manure, phosphate and potash are generally needed to maintain production for most crops.

Bucks cobbly silt loam, undulating phase (Bze) (Capability unit IIIe-4).—This red, well-drained soil occurs mainly on smooth upland ridgetops and mild slopes in the Triassic Lowland. Nearly all areas are south of Leesburg and are mostly in cutover hardwood forest. This soil has developed from weathered sandstone conglomerate. Runoff and internal drainage are medium. The hazard of erosion is slight to moderate. This soil differs from Bucks silt loam, undulating phase, mainly in containing many cobbles and in having slightly lighter colors in the surface soil. Cobbles and gravel occur throughout the subsoil and parent material and hamper cultivation. This soil is associated with Bucks silt loam, undulating phase, and the Manassas, Croton, Penn, and Calverton soils. Areas are in the Bucks (cobbly)-Penn (stony)-Calverton soil association.

Profile in a wooded area:

Surface soil—
0 to 7 inches, pale-brown, very friable cobbly silt loam; weak, very fine to fine, granular structure; top 2-inch layer is brown and covered by a thin layer of leaf litter.

Subsoil—
7 to 11 inches, yellowish-red, friable, light silty clay loam; weak, fine to medium, subangular blocky structure; a few pebbles and cobbles.
11 to 40 inches, red, friable to firm clay; strong, medium, subangular blocky structure; cobbles and pebbles in the lower part.

Parent material—
40 to 60 inches, mostly weathered multicolored sandstone conglomerate mixed with friable silt loam and silty clay loam soil material; many cobbles and pebbles.

The subsoil is better developed than in Bucks silt loam, undulating phase. The color of the subsoil ranges from yellowish red to reddish brown, and the texture, from silty clay loam to clay. The depth to bedrock ranges from 2½ to 5 feet but averages about 3½ feet. The surface soil is cobbly loam in places, and it ranges from pale brown to reddish brown. Small areas of Manassas silt loam near narrow intermittent drainageways are included.

This soil is strongly acid to extremely acid, low to moderate in organic matter, and low to medium in fertility. It is moderately permeable, retains added plant nutrients, and has a high capacity to hold water that plants can use.

Use and suitability.—Most of the acreage is in cutover forest. The rest is chiefly in pasture or cultivated crops. Because of cobbles, this soil is more limited in suitability than Bucks silt loam, undulating phase, but management

needs are similar. Its best use is for pasture. If the cobbles are removed, however, almost any local crop can be grown. Most areas need organic matter, lime, and complete fertilizers.

Bucks cobbly silt loam, rolling phase (Bzf) (Capability unit IVs-2).—This soil is similar to Bucks cobbly silt loam, undulating phase, but has stronger slopes and a shallower profile. Most slopes range from 7 to 14 percent, but in a small acreage they range from 14 to 25 percent. Runoff is rapid, and internal drainage is medium. The soil is more erodible than Bucks cobbly silt loam, undulating phase, and some areas have lost much surface soil. Small areas that have a loam surface soil and some that resemble the Penn soils are included with this soil.

Use and suitability.—Most of the acreage is in cutover forest. There are a few cultivated, pastured, and idle areas. Management practices are similar to those for Bucks silt loam, undulating phase. However, erosion control methods are needed, especially for row crops. These include the use of long rotations consisting mostly of close-growing crops and contour cultivation. This soil is more suitable for pasture in most places because of cobbles and strong slopes. Under ordinary management, yields of most crops are medium to low. The soil is difficult to work and conserve if cultivated, but it responds well to good management. It can easily be kept productive if used for pasture.

Calverton series

The Calverton series consists of somewhat poorly drained to moderately well drained soils on level to nearly level and very gently undulating relief. They have developed from weathered shale and sandstone. The subsoil may have a fragipan in the lower part. Calverton soils are deeper and slightly lighter in color than the associated Readington soils.

Calverton silt loam, undulating phase (Cb) (Capability unit IIIw-1).—In some places this light-colored, somewhat poorly drained to moderately well drained soil has a panlike layer in the subsoil. The soil occurs in depressions, on upland flats, around the heads of drainageways, and at the base of slopes. It has developed from weathered Triassic shale and sandstone. Most of the parent material is residual, but some consists of local colluvium and alluvium washed from surrounding uplands. Runoff is slow, and internal drainage is slow to very slow. Relief and drainage are within the range between the Readington and Croton soils. This soil resembles Belvoir loam, but it is more acid, has finer texture, and has different parent material. It is associated with Bucks, Penn, Readington, and Croton soils in the Triassic Lowland.

Profile in a cultivated area:

Surface soil—
- 0 to 7 inches, brownish-yellow to yellowish-brown, very friable silt loam; moderate, fine, subangular blocky structure; crushes easily to moderate, fine to very fine, granular structure.

Subsoil—
- 7 to 17 inches, brownish-yellow, friable silty clay loam; moderate to strong, medium, subangular blocky structure.
- 17 to 20 inches, yellowish-brown, friable, heavy silty clay loam faintly mottled with very pale brown and light gray; strong, medium, subangular blocky structure.
- 20 to 30 inches, silt loam to silty clay loam hardpan mottled with yellowish brown, pale brown, pinkish red, and gray; compact, very firm; strong, medium to coarse, platy structure; crushes to blocky structure in places.
- 30 to 34 inches, firm, heavy silty clay loam or silty clay distinctly mottled gray, yellowish red, pinkish red, and gray; plastic when wet; has less pan development than the horizon above; platy structure in some places and blocky structure in others.

Parent material—
- 34 to 40 inches, silt loam soil material mottled with gray, light reddish brown, light red, red, and dark red; contains many weathered, red, shaly sandstone fragments.

Parent rock—
- 40 inches +, red, shaly sandstone and shale; hard and unweathered.

The average depth is about 3 feet. The surface soil ranges from loam to heavy silt loam in texture and from 5 to 14 inches in thickness. The subsoil layers over the panlike layer range from brownish yellow to strong brown. The total range in thickness of the subsoil layers is 12 to 26 inches, but the average is about 14 inches. Faint mottles occur throughout the upper subsoil in places. The thickness of the panlike layer ranges from a few inches to 24 inches. Generally, the parent material is immediately beneath the panlike layer. In some places, however, a thick, prominently mottled layer is beneath the panlike layer. This mottled layer has a finer texture than the soil above and ranges from heavy silty clay loam to clay and silty clay. Included with this mapping unit are small areas of the following: Shallow soils with thin hardpan layers along the boundaries of the Readington soils; Manassas silt loam; and Croton soils.

Calverton silt loam, undulating phase, is strongly to very strongly acid and low in organic matter and natural fertility. The water table is rather high in wet weather because of shallow depth to the slowly permeable panlike layer and the low, smooth slopes. However, the capacity to hold water that plants can use is low to moderate. A narrow range of moisture conditions limits cultivation. When the soil is wet, machinery mires down; when the soil is dry, it is hard.

Use and suitability.—Most of the acreage is in cultivated, pastured, and idle areas. Management should include use of long rotations, lime, complete fertilizer, and grazing control. An increasing number of farmers use this soil more for pasture and hay than for corn.

Because of smooth slopes and low positions, slow runoff, and very slow to slow internal drainage, this soil is suitable for fewer crops than the associated Penn and Bucks soils. It is most suitable for permanent pasture or hay crops, except alfalfa; but corn, soybeans, and other row crops will produce fair yields if lime, complete fertilizer, and good crop rotations are used. Erosion is not a problem in most areas, but some flat, wet areas may need tile or ditch drainage if cultivated. Pasture mixtures that include ladino clover and fescue produce well when fertility is high.

Calverton silt loam, level phase (Ca) (Capability unit IVw-1).—This soil has slopes of 0 to 2 percent. It generally is not as well drained as Calverton silt loam, undulating phase. It has more wet spots in most places, and the profile is mottled at a higher level. Runoff and internal drainage are very slow to slow, and water drains from this soil more slowly than from Calverton silt loam, undulating phase. The areas of this soil are in the Calverton-Readington-Croton soil association.

Use and suitability.—Calverton silt loam, level phase, is used mainly for crops and permanent pasture. Because of very slow runoff and internal drainage, it is more suitable for permanent pasture and hay crops than for row crops or small grain. Ladino clover and fescue grow well if fertility is high. Lime, complete fertilizer, manure, and some drainage are needed for good pasture.

Captina series

The Captina series consists of soils on nearly level to very gently sloping stream terraces. They have a light-brown to yellowish-brown and grayish-brown silt loam surface soil. The subsoil is strong-brown silty clay loam in the upper part. A hard loamy fragipan layer is in the lower part between 16 and 24 inches. Beneath this layer are fluvial or other alluvial materials from the Piedmont Upland. They are mixed with limestone and probably sandstone products.

Captina silt loam (Cc) (Capability unit IIIw–1).—This somewhat poorly drained to moderately well drained soil occurs on very gentle slopes along the Potomac River terraces. It has developed in alluvium from limestone. Runoff is slow, and internal drainage is very slow to slow. This soil closely resembles the high terrace phase of Captina silt loam. It is a younger soil, however, and the pan layer is not as well developed. The low and rather large areas of this soil are reached by stream overflow. Drainage is intermediate in the range between that of the associated Elk and Robertsville soils. Areas of this soil are in the Captina-Robertsville-Elk soil association.

Profile in a cultivated area:

Surface soil—
0 to 8 inches, yellowish-brown to grayish-brown, very friable silt loam; moderate, medium, granular structure.

Subsoil—
8 to 12 inches, yellowish-brown to brownish-yellow, friable, light silty clay loam; moderate, medium, subangular blocky structure.
12 to 16 inches, strong-brown to yellowish-brown, friable to firm clay (plastic when wet); strong, medium to coarse, subangular blocky structure; pale-brown and light-gray mottles in the lower part.

Pan—
16 to 21 inches, firm clay mottled with strong brown, yellowish brown, gray, and pale brown; strong, medium to fine, blocky structure; moderate, fine to medium, platy structure when dry.
21 to 60 inches, very firm clay (plastic when wet); distinctly mottled gray, strong brown, and yellowish brown; moderate, medium, platy structure crushing to moderate, medium, blocky structure; a distinct gravel layer occurs at 39 to 42 inches.

Underlying material—
60 to 64 inches, silt loam distinctly mottled with gray, strong brown, and yellowish brown; mixed with many rounded quartz pebbles and other rock fragments.

The texture of the surface soil ranges from heavy silt loam to loam; texture of the subsoil ranges from silty clay loam to silty clay. The pan layer ranges from fine sandy loam to clay in texture and from a few inches to 45 inches in thickness. The depth to mottling ranges from 6 to 22 inches but averages about 16 inches. Small spots of Robertsville soil are included; they are shown on the map by wet-spot symbols.

Captina silt loam is generally strongly to very strongly acid. The subsoil is medium acid in a few places. The natural fertility is medium. The amount of organic matter is low to medium. Because of the pan layer in the subsoil, the soil has a low to moderate capacity to hold water that plants can use. Permeability is moderately rapid in the surface soil and very slow to slow in the subsoil. The soil retains added plant nutrients very well. The very slow to slow internal drainage impedes cultivation in wet seasons. The soil is suitable for only a limited variety of crops because of impaired drainage. Yields vary widely with slight seasonal changes.

Use and suitability.—Most of the acreage of this soil is in permanent pasture, mainly bluegrass and whiteclover. The rest is mostly in crops, is in forest, or is idle. Some farmers grow corn, small grain, and mixed hay in short rotations. Yields of corn and small grain are generally lower than on the better drained Elk and Sequatchie soils. Alfalfa is not grown successfully, because of the pan layer.

This soil is best suited to ladino clover, fescue, bluegrass, and white clover. Lime and complete fertilizers are needed. The soil responds to manure and crop residues.

Captina silt loam, high terrace phase (Cd) (Capability unit IIIw-1).—This soil, which occurs on medium high to high old stream terraces along the Potomac River, has a pan layer beneath the subsoil. It has developed in old alluvium from uplands that are underlain by mixed limestone, sandstone, and quartzite. Runoff is slow to medium, and internal drainage is very slow to slow. This soil occurs in fairly large tracts, although the total acreage is not extensive. It is associated with Hiwassee and Masada soils, but it occupies lower positions on stream terraces. Areas occur in the Hiwassee-Masada and the Captina-Robertsville-Elk soil associations.

Profile in a wooded area:

Surface soil—
0 to 9 inches, pale-yellow, very friable silt loam; moderate, fine, granular structure; the top half inch contains black partly decomposed forest leaves and twigs; in cultivated areas, this soil is yellowish brown to grayish brown.

Subsoil—
9 to 16 inches, brownish-yellow, friable silt loam; moderate, fine to medium, subangular blocky structure; roots are common.
16 to 22 inches, strong-brown, firm silty clay loam, generally mottled; strong, fine to medium, subangular blocky structure; angular quartz gravel ½ to 2 inches across in lower 3 inches.

Pan—
22 to 52 inches, very firm, compact silty clay loam with mottles of strong brown, brownish yellow, gray, yellow, and red; faint, few, and medium mottles; moderate, coarse, platy structure that breaks easily to strong, fine, subangular blocky structure.

Underlying material—
52 to 63 inches, partly weathered Triassic shaly sandstone; distinctly mottled red, gray, white, yellow, and strong brown; friable to firm.

The surface soil is almost white when dry and ranges in texture from silt loam to loam. The texture of the subsoil ranges from light silty clay loam to clay loam. The subsoil above the pan ranges from 8 to 20 inches thick but is generally about 14 inches. The pan layer is 10 to 36 inches thick. It ranges from silt loam to silty clay in texture but is light silty clay loam in most places. Quartz gravel occurs locally. Subsoil material has been plowed up in eroded spots. Wet spots occur

along drainageways and in some small, flat places. Cobbly soil impedes cultivation in a few undulating and rolling areas.

Captina silt loam, high terrace phase, is very strongly acid, low in organic matter, and low to medium in fertility. The capacity to hold water that plants can use is low to moderate. Permeability is moderately rapid in the surface soil, slow to moderate in the subsoil, and very slow in the pan layer. The moisture range for satisfactory cultivation is limited, since the soil remains wet long after rains and is hard in dry periods. This soil retains added plant nutrients very well. The hazard of erosion is slight. Productivity is fair to poor for many crops under management generally used.

Use and suitability.—This soil is mostly in crops and permanent pasture. A small part is in woodlots and a small part is idle. Rotations lasting 5 to 7 years are in general use. The most common rotation is corn and small grain, followed by mixed hay crops—mostly orchardgrass, timothy, lespedeza, and red clover. These crops are used for hay or temporary pasture for 2 to 3 years in the rotation before corn is planted again. A few farmers grow orchardgrass for seed.

This soil is not suited to alfalfa. Hay crops such as ladino clover, red clover, fescue, orchardgrass, and lespedeza are more suitable than corn and small grains. For most crop rotations complete fertilizers and lime are needed to maintain fertility. Nitrogen may be supplied by manure, crop residues, and legumes, but organic matter is greatly needed in most areas. A few areas may need surface drainage if used for row crops.

Catlett series

The Catlett series consists of excessively drained gray soils on rolling, hilly, and steep relief. Catlett soils, which resemble Brecknock soils, are generally less than 18 inches thick over rather hard rock. Cobbles, gravel, and stones are common.

Catlett gravelly silt loam, undulating phase (Ce) (Capability unit IIIe-5).—This is a very shallow to shallow, light-colored soil and is somewhat excessively drained. It occurs on smooth upland ridgetops and on gentle slopes in the Triassic Lowland. It was derived from weathered dark-gray, light-gray, and brownish sandstone and shaly sandstone. The parent material has been baked (changed in color from red) by heat from basic rock dikes, sills, and sheets. Runoff and internal drainage are medium to rapid. Small, shallow, and deep gullies have formed in places.

This soil is associated with Brecknock, Croton, and Kelly soils and adjoins Penn, Bucks, and Iredell soils in many places. Except for the grayish color and baked parent materials, this soil resembles the Penn soils. Areas are in the Catlett-Brecknock-Croton soil association.

Profile in a wooded area:

Surface soil—
0 to 7 inches, dark-gray to pale-brown, very friable gravelly silt loam; weak, fine, granular structure; the top half-inch is forest litter of very dark gray, partly decomposed leaves and twigs.

Subsurface—
7 to 14 inches, gray to grayish-brown, compact to friable silt loam soil material; weak, medium, subangular blocky structure; many highly weathered, shaly sandstone fragments ¼ to 2 inches across.

Parent material—
14 inches +, highly weathered, dark-gray baked shale and shaly sandstone, splotched with yellow and reddish brown.

The depth of this soil to bedrock ranges from 6 to 20 inches but averages about 15 inches. The color varies with that of the underlying shale and sandstone, which is gray through brownish red to weak red and splotched in many places. The soil is generally browner where it adjoins the Penn soil and grayer along the basic dikes where it adjoins Iredell soils. The texture ranges from loam to silt loam. Cobbles, a few stones, and occasional rock outcrops occur locally.

This soil is very strongly acid throughout and very low to low in organic matter and in natural fertility. Permeability is moderately rapid in the surface soil and subsurface layer and moderate to rapid in the parent material. The capacity to hold water that plants can use is low. The soil is fairly retentive of plant nutrients but much less so than the associated Brecknock and Kelly soils. It is fairly difficult to work and conserve.

Use and suitability.—Nearly all of this soil is used for crops and pasture. A few areas are idle or wooded. Rotations include corn, small grain, and mixed hays, mainly red clover, lespedeza, and timothy. Some orchardgrass is grown for hay.

This soil is not well suited to row crops, because of shallowness, low water-holding capacity, somewhat excessive drainage, and low fertility. Small grain and mixed hay crops do fairly well if intensive management is practiced. The soil requires lime, a complete fertilizer, manure, and crop residues for satisfactory production.

Catlett gravelly silt loam, rolling phase (Cf) (Capability unit IVs-2).—This soil has stronger slopes, a slightly shallower profile, and more gravel than Catlett gravelly silt loam, undulating phase. Runoff is rapid, and internal drainage is medium to rapid.

Use and suitability.—This soil is principally in pasture, cultivated crops, forest, and idle areas. The crops grown and the management practiced on this soil are similar to those on the undulating phase. Mainly because of its fairly strong slopes, this soil is best for pasture and forest. Small grain and mixed hay crops can be grown successfully in places, however, under intensive management.

Catlett stony silt loam, undulating phase (Cg) (Capability unit VIs-5).—This soil is not suitable for cultivation because of loose stones and cobbles on the surface and in the profile. Outcrops of bedrock occur in some places. Runoff is medium, and internal drainage is rapid. Areas of this soil are in the Brecknock-Catlett-Croton and the Catlett-Brecknock-Croton soil associations.

Use and suitability.—Most of this soil is in forest and pasture. Good management practices for pasture are the use of lime, complete fertilizer, drought-tolerant pasture grass, controlled grazing, and manure and other organic materials. Adequate rainfall is needed to produce good pastures on this soil.

Catlett stony silt loam, rolling phase (Ch) (Capability unit VIs-5).—This soil has somewhat stronger slopes and is more erodible than Catlett stony silt loam, undulating phase. In addition, it is more difficult to work and conserve. It has rapid runoff and internal drainage.

Use and suitability.—Most of this soil is in pasture and forest. A small part is cultivated. Although produc-

500057—60——5

tion is poor, fair to good pasture can be grown with good management.

Catlett stony silt loam, eroded rolling phase (Ck) (Capability unit VIs-5).—This soil is shallower and more eroded than Catlett stony silt loam, rolling phase, although it is similar in other ways. Erosion has removed practically all of the surface soil in places, and some gullies have formed. Runoff and internal drainage are rapid. The hazard of erosion is greater on this soil than on Catlett gravelly silt loam, rolling phase. A small acreage of the rolling phase is included with this mapping unit.

Use and suitability.—Most of the acreage of Catlett stony silt loam, eroded rolling phase, is forested or idle. Only a small part is used for crops and pasture. This soil is not well suited to crops, because of erosion and other unfavorable conditions. It is best suited to forest and pasture, but the pasture needs careful management.

Catlett stony silt loam, hilly phase (Cm) (Capability unit VIIe-2).—This soil has stronger slopes than Catlett stony silt loam, undulating phase. Slopes range from 14 to 25 percent. Runoff is rapid to very rapid, and internal drainage is rapid. The hazard of erosion is high to very high. The capacity to hold water that plants can use is low to very low.

Use and suitability.—Most of the acreage is in forest and pasture. Because of its hilly relief, this soil is not as well suited to pasture as Catlett stony silt loam, rolling phase, and yields are generally less. Pasture should not be overgrazed. Forest is best for some eroded and steep areas.

Catoctin series

The Catoctin series consists of brown, shallow, excessively drained soils on hilly and steep slopes (fig. 8). These soils have developed from weathered products of greenstone. They are associated with the Myersville and Fauquier soils. They resemble the Manor, Hazel, and Brandywine soils in color but have a shallower profile, finer texture, and less acid reaction. Catoctin soils are best suited to pasture or forest.

Figure 8.—**Type of home and buildings generally on steep, upland soils such as Catoctin, Manor, and Buckingham. Catoctin Mountain is in the background.**

Catoctin silt loam, rolling phase (Cn) (Capability unit IVe-2).—This shallow to moderately deep, somewhat excessively drained upland soil has developed from weathered products of Catoctin greenstone. It occupies narrow ridgetops and slopes, mainly in the Catoctin and Hogback Mountains. Runoff and internal drainage are rapid. This soil resembles Brandywine loam and silt loam, rolling phase, but it was derived from different parent materials and is shallower to bedrock. The natural vegetation is mainly hardwoods, grass, and legumes. This soil is associated with Fauquier, Myersville, and Meadowville soils. Areas are in the Myersville-Catoctin-Fauquier soil association.

Profile in a permanent pasture:

Surface soil—
0 to 8 inches, brown, very friable silt loam; moderate, fine, granular structure.
Subsurface—
8 to 12 inches, mingled strong-brown and yellowish-red, friable silt loam; weak, fine, subangular blocky structure that crushes easily to granular structure; many weathered schist particles.
Parent material—
12 to 15 inches, olive-yellow, reddish-yellow, yellowish-red, and black greenstone rock material mixed with a small quantity of yellowish-red, strong-brown, and red silt loam soil material.
15 inches +, bedrock.

The color of the surface soil ranges from yellowish brown to dark brown and the thickness from 4 to 8 inches. The depth to bedrock ranges from 12 to 30 inches but averages about 20. Massive chloritic greenstone underlies the more shallow areas. Loose angular stones and a few rock outcrops occur locally. A few small areas of this soil have some deep gullies, and a few have milder slopes. Small spots of Fauquier silt loam, undulating phase, and Myersville silt loam, rolling phase, are included with this soil.

This soil is medium to strongly acid and high in organic matter and natural fertility. Permeability is moderately rapid to rapid. The soil has a low capacity to hold water that plants can use. However, it retains plant nutrients fairly well and responds readily to fertilizers. The hazard of erosion is moderate to high. The soil is fairly difficult to work and conserve.

Use and suitability.—Most of this soil is in permanent pasture. A small part is in crops or forest. It is managed in much the same way as the associated Myersville soils. This soil is best suited to permanent pasture and hay crops, mainly because of its shallowness and fairly strong slopes. Small grain and some row crops can be grown successfully if the soil is well managed. Alfalfa is not well suited but can be grown under very intensive management. Much organic matter is needed to produce good yields.

Catoctin silt loam, hilly phase (Co) (Capability unit VIe-2).—Except for relief, this soil is similar to Catoctin silt loam, rolling phase. It occupies upland ridges and hillsides near large streams. Runoff and internal drainage are medium to rapid. Areas of this soil are in the Myersville-Catoctin-Fauquier soil association.

Use and suitability.—Most of this soil is in permanent pasture and forest. It is best suited to these uses under present conditions. Because of its stronger slopes, this hilly phase is more difficult to work and conserve than Catoctin silt loam, rolling phase. Good management practices that include use of lime and fertilizer will keep pastures productive. Manure and other organic matter are particularly needed on this soil.

Catoctin silt loam, eroded hilly phase (Cp) (Capability unit VIe-2.—This droughty soil is shallower to bedrock than Catoctin silt loam, hilly phase, and is very erodible. In places, 75 percent or more of the surface soil has been removed by erosion, and some shallow and deep gullies have formed. Runoff is rapid to very rapid, and internal drainage is rapid. The capacity to hold water that plants can use is low to very low.

Use and suitability.—Most of this soil is in pasture, forest, and idle areas. The management practices used are mainly close grazing, a little clipping of weeds, some liming, and fertilization with phosphate. Hilly relief and erosion limit the use of this soil to pasture or forest. Practices needed to establish and maintain good pasture are the use of lime, complete fertilizer, manure, or other organic material, grazing control, and the reseeding of the more severely eroded areas.

Catoctin silt loam, steep phase (Cr) (Capability unit VIe-2).—This soil occurs in deeply dissected areas near larger streams and on high mountainsides. It differs from Catoctin silt loam, rolling phase, mainly in having stronger slopes and a somewhat shallower profile in most places. It is more erodible than the hilly and rolling phases of Catoctin silt loam. Runoff and internal drainage are rapid.

Use and suitability.—Most of this steep soil is used for pasture or forest, for which it is best suited. Good management can establish permanent pasture generally. On the steep slopes, it is difficult to apply fertilizer and lime and to clip weeds. These practices, however, are needed to maintain production.

Catoctin silt loam, eroded steep phase (Cs) (Capability unit VIIe-3).—This soil is essentially the same as Catoctin silt loam, steep phase, but is more severely eroded. Much of the surface soil has been removed by erosion, and some shallow and deep gullies have formed. Runoff is very rapid, and internal drainage is rapid. This soil is hard to work and conserve. It has poor to fair productivity and a very low capacity to hold water that plants can use.

Use and suitability.—Most of this soil is in forest or idle. A small part is in pasture. Mainly because of steep slopes and erosion, this soil is best suited to forest. Permanent pasture can be grown successfully on some areas if soil material and plant nutrients are conserved by careful management.

Catoctin stony silt loam, rolling phase (Ct) (Capability unit VIs-3).—This soil is similar to Catoctin silt loam, rolling phase, but near the surface from 10 to 25 percent of the soil mass consists of stones and cobbles that impede cultivation. Some outcrops of bedrock occur locally. Runoff and internal drainage are medium to rapid. A small acreage that has undulating relief is included. Areas of this rolling phase are in the Myersville-Catoctin-Fauquier soil association.

Use and suitability.—Most of this soil is in permanent pasture. Some is in crops, forest, and idle areas. Management is similar to that used for the associated nonstony types and for Myersville and Fauquier soils.

Rolling slopes, shallowness, and stoniness make this soil poorly suited to crops. It is best suited to permanent pasture or forest. Row crops and many hay crops can be grown on some farms. Most of the stones and cobbles can be removed.

Catoctin stony silt loam, eroded rolling phase (Cu) (Capability unit VIs-3).—This soil is similar to Catoctin silt loam, rolling phase, but it differs in being stony and eroded. Stones and cobbles that are strewn over the surface and embedded in the profile compose 15 to 25 percent of the soil mass and impede cultivation. Runoff is rapid to very rapid, and internal drainage is rapid.

Use and suitability.—Most of this soil is in pasture and crops. Since it is not so suitable for crops and pasture as Catoctin stony silt loam, rolling phase, more careful management is needed. Generally, this soil is best suited to pasture.

Catoctin stony silt loam, hilly phase (Cv) (Capability unit VIs-4).—This soil has steeper slopes than Catoctin stony silt loam, rolling phase. Runoff and internal drainage are rapid. Many areas of this soil are very erodible.

Use and suitability.—Most of this soil is used for permanent pasture. About 20 percent is in forest and idle areas. Hilly relief, stoniness, and shallowness make the soil difficult to work and conserve. It will produce pasture of good quality, but requires complete fertilizer, lime, and grazing control.

Catoctin stony silt loam, eroded hilly phase (Cw) (Capability unit VIs-4).—This soil is similar to Catoctin stony silt loam, hilly phase, but 25 to 75 percent or more of its surface soil has been lost through erosion. An occasional deep gully has formed. Runoff and internal drainage are rapid, and the hazard of erosion is high to very high. Tilth is very poor.

Use and suitability.—A large part of this soil is in permanent pasture, forest, and idle areas. The pasture consists mainly of broomsedge, bluegrass, and whiteclover, although some briers and weeds occur. The trees are mostly hardwoods. Some areas have reverted to almost pure stands of Virginia scrub pine. Good pasture practices are the use of complete fertilizer, lime, manure, crop residues and the control of grazing.

Catoctin stony silt loam, steep phase (Cx) (Capability unit VIIs-1).—This soil has stronger slopes and a much shallower profile than Catoctin silt loam, rolling phase. It also differs in being stony. It occupies deeply dissected uplands along mountainsides. Runoff is rapid to very rapid, and internal drainage is rapid. The soil is very erodible.

Use and suitability.—This soil is used principally for permanent pasture and forest. It is difficult to fertilize and mow on the steep slopes, but these practices are needed to maintain production.

Catoctin stony silt loam, eroded steep phase (Cy) (Capability unit VIIs-1).—This soil has lost 75 percent or more of the surface soil in many places. An occasional shallow or deep gully has formed. Runoff is very rapid, and internal drainage is rapid. The soil is droughty and very erodible.

Use and suitability.—Most of this soil is in forest and idle areas. This soil is difficult to work and conserve because of shallowness, stoniness, erosion, and steep slopes. It is well suited to forest.

Chester series

The Chester series consists of well-drained, moderately deep, extensive soils of undulating and rolling relief in the Piedmont Upland area. They have developed from weathered, medium- to coarse-grained acidic granodiorite.

In most places the surface soil is brown loam and silt loam. The subsoil is strong-brown to yellowish-red sandy clay loam to silty clay loam. The parent material is relatively thick and has many colors, chiefly shades of brown, red, yellow, gray, and white. The Chester soils resemble the Myersville soils, which developed over greenstone schist and biotite gneiss. The Chester soils, however, have coarser texture and are deeper. They are among the best soils in the county for agriculture.

Chester loam, undulating phase (Cza) (Capability unit II-2).—This very deep, well-drained soil, one of the best in the county, occurs in scattered areas on upland in the Piedmont Upland area. Runoff and internal drainage are medium. This soil is associated with Brandywine, Eubanks, Belvoir, and Meadowville soils. Areas of it are in the Eubanks-Chester, the Chester-Brandywine (loams and silt loams), and the Chester-Brandywine (loams and sandy loams) soil associations.

Profile in a cultivated area:

Surface soil—
0 to 8 inches, brown to yellowish-brown, very friable loam; weak, very fine to fine, granular structure; a few small pieces of quartz gravel; in wooded areas, the first one-half inch of this layer is darker.

Subsoil—
8 to 16 inches, yellowish-brown, friable heavy loam or light fine sandy clay loam; weak, fine to medium, subangular blocky structure.
16 to 30 inches, yellowish-red, friable coarse sandy clay loam to heavy fine sandy clay loam; moderate, medium, subangular blocky structure.
30 to 40 inches, coarse sandy loam mottled with yellowish red, red, strong brown, and yellowish brown; very friable; very weak, fine, subangular blocky structure; common, fine, faint mottles that derived their colors from the parent material.

Parent material—
40 to 53 inches +, weathered, medium- to coarse-grained granodiorite mottled with yellowish brown, strong brown, weak red, very pale brown, gray, white, and light olive; color of the mottles derived from the parent material; contains a small quantity of very friable soil material.

The surface soil is dark brown in places. Its texture ranges from coarse sandy loam to silt loam. The subsoil ranges in texture from heavy sandy loam to heavy sandy clay loam. The thickness of the subsoil ranges from 6 to about 48 inches but is generally about 20 inches. The depth of the soil to the uneven bedrock floor ranges from 6 to 20 feet but averages about 10 feet. As mapped, this soil includes small areas of Chester loam, rolling phase, and of Meadowville loam.

Chester loam, undulating phase, is medium to strongly acid, low to moderate in organic matter, and relatively high in potassium. It is medium in fertility, fairly retentive of added plant nutrients, and moderately erodible. The permeability of the surface soil is rapid, and that of the subsoil is moderate to moderately rapid. The soil has a high capacity to hold water that plants can use, although some sandier areas leach rather rapidly. It is easy to conserve and will produce many different crops.

Use and suitability.—All areas of this soil, except a few woodlots, are used for crops. The common rotations are 5 to 6 years in length and include corn, small grain, and mixed hay. The longer rotations use alfalfa in many areas and orchardgrass for seed and hay. Orchardgrass is generally grazed after being cut for seed.

This soil is well suited to all local crops, especially corn, small grain, hay, and many vegetables. Orchards and berries are well suited, and there are several good home orchards. Lime and phosphate are the most needed amendments. Organic matter, nitrogen, and potash are required, however, if no manure is used and no legumes are grown.

Chester silt loam, undulating phase (Czb) (Capability unit IIe-2).—This soil, which occurs on uplands in the Piedmont Upland area, has developed from weathered products of fine-grained schistose granodiorite. It resembles Myersville silt loam, undulating phase, but had different parent material and is much deeper over bedrock in most places. The soil is associated with Brandywine, Belvoir, Meadowville, and Chester loam soils. Areas are in the Chester-Brandywine (loams and silt loams) soil association.

Profile in a virgin area:

Surface soil—
0 to 7 inches, dark-brown to brown, very friable silt loam; strong, fine to medium, granular structure; the first inch of this layer is darker and contains many grass roots.

Subsoil—
7 to 29 inches, yellowish-red, friable to firm, slick silty clay loam; strong, medium to coarse, subangular blocky structure; many pores; some soft, highly weathered schistose granodiorite fragments in the lower part.
29 to 34 inches, friable, heavy silt loam mottled with strong brown, yellowish red, pale yellow, pale brown, dark grayish brown, and white; weak, fine to medium, subangular blocky structure; many, fine to medium, distinct mottles with color derived from the parent material.

Parent material—
34 to 61 inches +, weathered schistose granodiorite material mottled and streaked with white, brown, yellow, and black; crushes very easily to slick silt loam; many, fine, prominent mottles and streaks.

The subsoil ranges from strong brown to reddish brown but is mostly yellowish red. Its thickness ranges from 6 to 40 inches but in most places is about 24 inches. The depth of this soil to bedrock ranges from 6 to 20 feet but averages about 10 feet. A few small areas of soil resembling Montalto silt loam, undulating shallow phase, are included.

Chester silt loam, undulating phase, is medium to strongly acid. The amount of organic matter is low to moderate, and that of potassium is moderately high. Fertility is medium. This soil retains added plant nutrients well and has a moderate capacity to hold water that plants can use. It is very easy to work.

Use and suitability.—This soil produces the same crops as Chester loam, undulating phase, but it is less well suited to vegetable crops. A small acreage is in woodlots. Both soils have similar management requirements.

Chester loam and silt loam, undulating phases (Czc) (Capability unit IIe-2).—The soils of this unit are mapped together because they occur in intricate association. They are on wide, smooth upland ridgetops in the Piedmont Upland area and are among the best and most extensive soils in the county. The loam type is underlain by medium-grained weathered rock material, and the silt loam type, by fine-grained, sheared schistose rock material. Both types are well drained and have medium runoff and internal drainage.

A number of different profiles occur within areas outlined on the map. In a given area, about 55 percent is

Chester loam, undulating phase, and about 30 percent is Chester silt loam, undulating phase. The rest is soil that is intermediate in profile characteristics. In some places the subsoil of the transitional profile is sandy clay loam like that of the loam type; in others it is silty clay loam like that of the silt loam type.

The soils of this mapping unit are associated with the Meadowville, Belvoir, and Worsham soils. Areas are in the Chester-Brandywine (loams and silt loams) soil association.

Profile of Chester loam, undulating phase, in a wooded area:

Surface soil—
½ to 0 inch, very dark brown forest duff, mostly oak leaves, twigs, and fine roots.
0 to 3 inches, dark-brown, very friable loam; weak, medium, granular structure; few, small, angular pieces of quartz gravel.
3 to 7 inches, yellowish-brown, very friable silt loam or heavy loam; moderate, medium, granular structure; few, small, angular pieces of quartz gravel.
Subsoil—
7 to 11 inches, strong-brown, friable to firm heavy loam or light silty clay loam; moderate, medium, blocky structure; a few small pieces of quartz gravel.
11 to 24 inches, strong-brown to yellowish-red, firm to friable fine sandy clay loam or light silty clay loam; strong, medium to coarse, blocky structure; much quartz grit and many small gravel particles, especially in the lower part.
24 to 33 inches, friable loam, dominantly strong brown mottled with lighter shades of brown and yellow; common, fine, faint mottles; weak, medium, blocky structure that crushes easily to fine, crumb structure; many angular particles of quartz grit and gravel.
Parent material—
33 to 48 inches +, friable, micaceous, slick, weathered granodiorite material mottled with brown, yellow, and gray; many coarse, prominent mottles.

Profile of Chester silt loam, undulating phase, in a wooded area:

Surface soil—
½ to 0 inch, very dark brown forest litter, mostly partly decomposed oak leaves and twigs with a mat of fine roots.
0 to 3 inches, dark reddish-brown, very friable silt loam; strong, fine to medium, crumb structure.
3 to 7 inches, dark-brown, friable silt loam; weak, fine, blocky structure; crushes easily to strong, fine to medium, granular structure.
Subsoil—
7 to 29 inches, yellowish-red, firm silty clay loam; strong, medium to coarse, blocky structure; some very pale brown, soft, highly weathered schistose fragments in the lower part.
29 to 34 inches, friable to firm heavy silt loam mottled with strong brown, yellowish red, white, pale yellow, and dark grayish brown; many, fine to medium, distinct mottles; medium, subangular blocky structure.
Parent material—
34 to 61 inches +, weathered schistose granodiorite material mottled and streaked with white, brown, yellow, and black; many, fine, prominent mottles and streaks; crushes very easily to silt loam, which feels slick.

The depth of the soils of this undifferentiated mapping unit to bedrock ranges from 6 to 20 feet but averages about 10 feet. The surface soil ranges in texture from silt loam to sandy loam. The sandy loam occurs in some very small spots. The subsoil is yellowish brown, strong brown, or yellowish red. It is yellowish red in most places, however, especially in the second layer. The thickness of the subsoil ranges from 6 to 45 inches but is generally about 24 inches. A few stones and pieces of loose quartz gravel occur locally.

The soils are medium to strongly acid, low to moderate in organic matter, and medium to rather high in natural fertility. The erosion hazard is slight to moderate. The soils of this unit have a fairly large amount of total potassium. In many places they contain some very fine micaceous material. The permeability of the surface soils of this undifferentiated group is moderately rapid to rapid, and that of the subsoils is moderate. The capacity to hold water that plants can use is high. The soils retain plant nutrients, respond to good management, and are easy to work and conserve. The loam type is lower in organic matter and natural fertility and has a lower pH value than the silt loam type.

Included with Chester loam and silt loam, undulating phases, are small areas of Brandywine loam and silt loam, Meadowville silt loam, and Meadowville loam.

Use and suitability.—Nearly all of the acreage is cultivated. Management is similar to that of Chester loam, undulating phase, and Chester silt loam, undulating phase.

Chester loam and silt loam, rolling phases (Czd) (Capability unit IIIe-2).—These soils have stronger slopes, shallower depth to bedrock, and thinner profile layers than Chester loam and silt loam, undulating phases. They occupy slopes leading from upland ridgetops in the Piedmont Upland area. The depth of the soils to bedrock ranges from 5 to 18 feet but averages about 8. Runoff is medium to rapid, and internal drainage is medium. Since these rolling soils are more erodible than the undulating phases, some areas have lost much more surface soil. A few shallow and deep gullies have formed. These rolling soils are associated with the undulating phases. Areas are in the Chester-Brandywine (loams and silt loams) soil association.

Use and suitability.—The soils of this undifferentiated group are in crops and pasture. They have more acreage in pasture than Chester loam and silt loam, undulating phases, but have similar management. If these soils are cultivated, erosion should be controlled by contour tillage, sod crops in the rotation, and stripcropping in places.

These soils are suited to a wide variety of crops. Although they respond well to good management and are rather easy to work, they are more difficult to conserve than the undulating phases. They have a lower capacity to hold water that plants can use and are slightly less productive of most crops.

Chester-Brandywine loams and sandy loams, undulating phases (Cze) (Capability unit IIe-2).—The soils of this unit are so intricately associated that they cannot be separated on a map of the scale used. About 60 percent of the acreage consists of Chester loam, and the rest consists of Brandywine sandy loam and a few red spots of Eubanks loam. The topography is choppy or hummocky.

The Chester soil has a brown loam surface soil and moderately thick sandy clay loam subsoil. The Brandywine soil has a brown to yellowish-brown sandy loam to gritty sandy loam surface soil and a very thin subsoil or no subsoil. Loose stones and gravel and some outcrops of acidic granodiorite are present, mainly in the Brandywine areas.

Runoff is medium, and internal drainage is medium to rapid. The Brandywine soils of this complex have profiles similar to that of Brandywine sandy loam, rolling phase, and the Chester soils have profiles similar to that of Chester loam, undulating phase. A small acreage of Chester loam, shallow undulating phase, and of Chester sandy loam, undulating phase, are included. Areas of this unit are in the Chester-Brandywine (loams and sandy loams) soil association.

This complex of soils is medium to strongly acid and has a low to medium amount of organic matter and a rather high amount of potassium. The fertility is medium to high. The capacity to hold water that plants can use is moderate in the Chester soil and low in the Brandywine soil. Permeability is rapid in the surface soil and moderate to rapid in the subsoil. The hazard of erosion is slight to moderate. The soils respond readily to good management, especially to the use of manure and crop residues.

Use and suitability.—Nearly all of the acreage has been cleared and most of it is cultivated. The rest is in permanent pasture or is idle. Rotations are commonly 4 to 6 years in length and include corn, small grain, and mixed hay. Orchardgrass is grown for seed in the longer rotations but is used as pasture in the latter years of the rotation. Alfalfa is grown on some areas and produces good yields under intensive management. Yields, however, are not so great as on Chester loam and silt loam, undulating phases. Commercial fertilizer, lime, manure, and crop residues are added in small to moderately large amounts. Yields are moderately high on this complex of soils.

The soil acidity limits good yields, and lime is needed to raise the pH to the desired level, usually 6.0 to 6.5. Phosphate is the nutrient most needed on these soils. However, nitrogen is also required for corn, small grain, and some grass crops if it is not furnished by manure and crop residues. Although these soils have a fairly large amount of potassium, they need this nutrient for alfalfa and other legumes. Complete fertilizers and manures should be used on fields that have been poorly managed or long idle. Manure and mulches are needed mostly on the sandier Brandywine soil.

Chester-Brandywine loams and sandy loams, rolling phases (Czf) (Capability unit IIIe–2).—These soils have stronger slopes than Chester-Brandywine loams and sandy loams, undulating phases. They also contain a larger acreage of Brandywine soils and have a slightly shallower profile in most places. Runoff and internal drainage are medium to rapid. These soils are more erodible than the undulating phases, and some areas have lost much surface soil. A small acreage has some deep gullies. Small areas of Chester loam, shallow phase, and Chester sandy loam are included in this unit.

Use and suitability.—Most of the acreage of these soils is used chiefly for crops and pasture; a small part is in forest and idle areas. Management is similar to that of the undulating phases, but erosion must be carefully controlled. These soils are suitable for a wide variety of crops. They respond well to good management and are fairly easy to work and conserve.

Chewacla series

The Chewacla series consists of somewhat poorly drained to moderately well drained soils. The surface soil is brown to dark-brown silt loam. The subsoil is silt loam to silty clay loam mottled with pale brown, very pale brown, yellowish brown, strong brown, and light brownish gray. The parent material is distinctly mottled, highly micaceous silt loam containing strata of rounded and subangular gravel and cobbles from the Piedmont Upland. The Chewacla soils have characteristics of relief, drainage, and color that are between those of the Congaree and Wehadkee soils. Only one soil of the Chewacla series is mapped in the county.

Chewacla silt loam (Czg) (Capability unit IIIw–2).—This is a young somewhat poorly drained to moderately well drained soil on first bottoms. It has formed in recent alluvium originating from Piedmont Upland that is underlain by granite, granodiorite, schist, and greenstone. This soil is subject to flooding. It is associated with the poorly drained Wehadkee silt loam and the well-drained Congaree soils, and in elevation and drainage is intermediate between these two soils. It has slow runoff and internal drainage but is moderately permeable. In drainage, relief, and position, Chewacla silt loam resembles Rowland silt loam on first bottoms in the Triassic Lowland. It differs mainly in having a different parent material and a less reddish color. The natural vegetation is mainly willow, sycamore, elm, red birch, red maple, white oak, boxelder, and many grasses and other plants that tolerate moist soil. These include bluegrass, whiteclover, broomsedge, foxtail, lespedeza, plantain, stickweed, goldenrod, sedgenutgrass, horsemint, orchardgrass, fescue, asters, ragweed, milkweed, and hen's-nestgrass. Areas of this soil are in the Chewacla-Congaree-Wehadkee soil association.

Profile in a cultivated area:

Surface soil—
0 to 14 inches, brown to dark-brown, very friable silt loam; moderate, fine, granular structure; roots plentiful in upper 6 to 8 inches; few, very fine mica flakes; faint mottles in the lower part.
14 to 20 inches, friable heavy silt loam mottled with very pale brown, pale brown, yellowish brown, and strong brown; moderate, fine to medium, subangular blocky structure; many small mica flakes and a few black concretions.
Subsoil—
20 to 56 inches, heavy silt loam to silty clay loam mottled with very pale brown, light brownish gray, strong brown, and yellowish brown; moderate, medium to coarse, subangular blocky structure; common, distinct, medium to coarse mottles; mica flakes and black films are common.
Underlying material—
56 inches +, mottled alluvium composed of highly micaceous silt loam and many subangular and rounded pieces of gravel washed from the Piedmont Upland.

The texture of the surface soil ranges from silt loam to loam, and that of the underlying layers from silt loam to silty clay loam. Sandy and loamy materials are left almost every year by stream overflow.

This soil has the following inclusions: Small spots of gravelly and sandy loam near the stream banks and in old stream beds; undifferentiated soil areas along some smaller stream bottoms; small wet spots of Wehadkee silt loam, shown by symbol on the soil map; and small areas of Meadowville soils, which occur where bottom

lands adjoin upland slopes and intermittent drainageways.

Chewacla silt loam is medium acid in most places but ranges from strongly acid to slightly acid. The amount of organic matter and the natural fertility are medium to moderately high. The capacity to hold water that plants can use is moderate to low. Permeability is moderately rapid in the surface layer and moderate to slow in the lower layers. This soil retains added plant nutrients. It is harder to work than soils not reached by stream overflow and is suitable for a limited variety of crops. It is not greatly affected by drought.

Use and suitability.—Most of this soil is in pasture. Some is in crops, mostly corn and mixed hay, and some is idle. Rotations and crops are similar to those of the adjoining uplands. A few farmers grow corn for several years before returning the land to hay. Mainly because of somewhat poor drainage and the hazard of flooding, the soil is best suited to pasture, corn, and some hay crops. It is very poorly suited to small grains and alfalfa and to potatoes and many other vegetable crops. Under ordinary management, average crop yields are less than on the associated Congaree soils.

Good management includes the use of complete fertilizers and lime. Pasture soil can be improved in many places by bedding and ditching. This soil could be one of the best in the county for pasture if well managed.

Clifton series

The Clifton series consists of soils on top of the Blue Ridge. They have a brown to dark-brown stony silt loam surface soil and a yellowish-red, reddish-brown, and red silty clay loam to light silty clay subsoil. The soils are underlain by material weathered from chloritic greenstone. The parent material is dominantly strong-brown, firm to friable, heavy silt loam to silty clay loam mottled with red, reddish yellow, black, and olive yellow. It is mixed with many weathered greenstone fragments of similar colors. Clifton soils resemble the Myersville and Fauquier soils but have a darker brown surface soil and many stones and gravel throughout the profile. Only one soil of this series is mapped in the county.

Clifton stony silt loam, undulating and rolling phases (Czh) (Capability unit VIs–3).—This moderately deep to deep, well-drained soil is characterized by a brown to dark-brown, stony surface soil. It occurs at high elevations and has formed from residual products of weathered massive greenstone. Runoff is medium to rapid, and internal drainage is medium. This soil resembles Myersville and Fauquier soils, except for its dark-colored surface soil and abundance of stones and boulders.

The natural vegetation in wooded areas is hickory, walnut, locust, yellow-poplar, white, black, and red oaks, ash, dogwood, sassafras, chokecherry, chestnut (dead), spicewood, wild grape, poison-ivy, and elderberry. Vegetation on idle areas is broomsedge, tall poverty oatgrass, asters, goldenrod, dewberries, blackberries, sumac, sassafras, hackweed, cinquefoil, narrowleaf plantain, bluegrass, whiteclover, dogwood, and Virginia pine. In pasture fields the dominant vegetation is bluegrass, whiteclover, broomsedge and crabgrass. This soil is in the Rocky land and Very rocky land, basic rock phases-Clifton soil association.

Profile in an idle area:

Surface soil—
0 to 8 inches, dark reddish-brown to dark-brown, very friable stony silt loam; medium to strong, fine, granular structure; slightly darker in topmost 2 inches; many grass roots; large stones on surface and embedded in the soil.

Subsoil—
8 to 15 inches, yellowish-red, friable light silty clay loam; moderate, fine to medium, subangular blocky structure; few stones.
15 to 32 inches, yellowish-red, firm, heavy silty clay loam; strong, medium to coarse, subangular blocky structure; few yellow and red streaks on cleavage planes of structure peds; few stones.

Parent material—
32 to 68 inches, dominantly strong-brown, firm, heavy silt loam soil material mottled with reddish yellow, red, black, and olive yellow; contains many partly decomposed greenstone schist fragments of similar colors; structure is similar to that of the original schistose parent rock.

The depth of this soil to bedrock ranges from 6 to 25 feet but averages about 10. The surface soil ranges from 6 to 10 inches in thickness. It ranges from yellowish brown to very dark brown in color but is dark brown in most places. The subsoil ranges from yellowish brown through strong brown and yellowish to red. The texture is light clay in places. Stones and cobbles 4 to 36 inches across prevent cultivation in most areas and are fairly uniformly scattered. In very small local areas, 50 percent of the surface soil consists of loose stones. In places schist and quartz gravel and very shallow soils occur in this soil.

This soil is medium to strongly acid and moderate to high in organic matter. It is medium to high in natural fertility. The capacity to hold water that plants can use is high. Permeability is very rapid in the surface soil and moderate in the subsoil. The soil retains added plant nutrients well and is easy to conserve, but it is difficult to work with heavy machinery.

Use and suitability.—Most of the acreage is in forest or is idle. The rest is pastured and cultivated. Because of stoniness, this soil is not suited to many crops. It is best suited to permanent pasture. Bluegrass and white clover produce well if limed, fertilized, and closely grazed. Ladino clover, orchardgrass, and red clover grow well.

Congaree series

The Congaree series consists of brown, well-drained soils on nearly level to level relief. They occupy rather high positions on the first bottoms. The surface soil and subsurface layers are brown to dark-brown loam. The underlying alluvial material is brown, very friable loam and fine sandy loam. Congaree soils contain many small mica flakes throughout. Rounded, river-deposited quartz gravel and cobbles occur at great depths. These soils resemble the Huntington and Bermudian soils in color and texture.

Congaree silt loam (Czm) (Capability unit I–1).—This is one of the most fertile and productive soils of the bottom lands. It is a deep, brown, well-drained soil that has formed in recent alluvium washed from uplands underlain by granite, granodiorite, schist, and greenstone. It is associated with Chewacla and Wehadkee soils, but it is browner, better drained, deeper, and more productive. Although it occupies slightly higher positions than these associated soils, it is periodically flooded. Runoff is slow,

and internal drainage is medium. Congaree silt loam resembles Bermudian silt loam of the Triassic Lowland, but it is generally browner and has developed from different parent material. Areas of Congaree silt loam are in the Chewacla-Congaree-Wehadkee soil association.

Profile in a cultivated area:

Surface soil—
0 to 14 inches, brown, very friable silt loam; weak, fine, granular structure; soft when dry; many very small mica flakes.
Subsurface—
14 to 42 inches, brown, friable, heavy silt loam; weak, fine, subangular blocky structure that crushes readily to weak, fine, granular structure; many small mica flakes.
Underlying material—
42 to 60 inches, brown, very friable loam to fine sandy loam; some coarser sandy material, small quartz gravel, and cobbles; many fine mica flakes.

In some areas the soil is thinner over beds of gravel and cobbles. In places the surface soil is loam or very fine sandy loam. Spots of loamy sand occur near creek banks and in sharp bends.

This soil is generally medium acid to slightly acid (pH 5.4 to 6.5). It is somewhat high in organic matter, plant nutrients, and capacity to hold water that plants can use. Permeability is moderate through all the soil layers. The soil has excellent tilth. It is easily conserved and highly productive of many local crops. However, it is not suited to so wide a variety of crops as the better upland soils.

Use and suitability.—This soil is used mostly for crops and pasture. Corn and hay are the main crops. Most hay crops except alfalfa are well suited. Small grain is grown in a few areas, but it tends to lodge and to have low yields on most areas of this soil. Overflow reduces corn yields in some years. Average yields over a long time are lower than those on the better upland soils.

Good practices are the use of short rotations, of complete fertilizer, and of lime. Organic matter and nitrogen are not so greatly needed as on the upland soils. Deficiencies of these nutrients, however, are becoming evident where the soils are intensively cropped to row crops.

Congaree fine sandy loam (Czk) (Capability unit I–1).—This soil is similar to Congaree silt loam but was derived from coarser textured materials and generally occupies positions near stream banks and higher bottom lands.

In addition, it is slightly lighter in color, contains less organic matter, and is lower in natural fertility. Because of its position near stream beds, this soil is flooded more than Congaree silt loam. Runoff is slow, and internal drainage is medium to rapid. Some areas are loamy sand.

Use and suitability.—Nearly all of this soil is pastured or cultivated. Bluegrass and whiteclover for pasture and corn and hay are the main crops. Management requirements are similar to those of Congaree silt loam. Because of its coarser texture, however, this soil is better suited to vegetable crops and less well suited to hay and corn. There is moderately rapid leaching of added plant nutrients. More organic matter and slightly heavier applications of fertilizers are needed. This soil is easy to work. Flooding limits its suitability for many crops.

Croton series

The Croton series consists of poorly drained, light-colored soils on nearly level to undulating relief on the Piedmont Lowland or Triassic Lowland. They occur on upland flats and at the heads and upper courses of drainageways. They have dominantly grayish-brown silt loam surface soil that is faintly mottled with strong brown, yellow, and yellowish red. The silty clay, clay, or sandy clay subsoil is prominently mottled with gray, pinkish gray, strong brown, and red. The silt loam to silty clay loam parent material is prominently mottled with red, gray, pinkish gray, and strong brown and mixed with many fragments of red, pale-red, and yellowish-red shale, shaly sandstone, and siltstone. The Croton soils resemble the Worsham soils in color, relief, drainage, and use.

Croton silt loam, level phase (Czn) (Capability unit IVw-1).—This gray, poorly drained soil (locally called crawfish land) occurs on upland flats near streamheads in the Triassic Lowland. It is associated with Penn, Bucks, Calverton, Manassas, Brecknock, and Catlett soils and was derived from similar residual material derived from sandstone and shale. Generally this soil is lower than the associated soils and receives seepage water from them in places. Runoff and internal drainage are very slow to slow. This soil resembles Worsham silt loam, but it has, for the most part, finer texture, and it is shallower and is underlain by a different parent material.

The natural vegetation is water-tolerant trees, shrubs, and grass, mainly oaks (pin, willow, swamp, chestnut, white, and black), elm, blackgum, elder, alder, sedgenut-grass, and rushes. Areas of this soil are in the Penn-Calverton-Croton and the Calverton-Readington-Croton soil associations.

Profile in a cultivated area:

Surface soil—
0 to 9 inches, friable silt loam faintly mottled with light brown, gray, grayish brown, and yellowish brown; coarse, medium, platy structure that crushes to moderate, fine to medium, granular structure; many roots; packed by heavy farm machinery.
Subsoil—
9 to 16 inches, firm silty clay (slightly plastic when wet); mottled pale brown, light gray, yellowish brown, and light brownish gray; mottles are many, distinct, and medium; strong, fine to medium, subangular blocky structure.
16 to 34 inches, slightly plastic silty clay (hard when dry); distinctly mottled red, pinkish gray, light gray, and yellowish red; moderate, medium, subangular blocky structure; few rounded pieces of quartz gravel.
Parent material—
34 to 42 inches, friable silt loam distinctly mottled with red and gray; contains much partly weathered, reddish, shaly sandstone.
Bedrock—
42 inches +, red, horizontally bedded, hard, shaly sandstone.

Most areas are dominantly gray with brown mottles. Some places, however, have many yellowish and brownish mottles throughout the profile, even where water stands most of the time. A 3- to 8-inch layer has been deposited in places, especially along the upper courses of drainageways. This layer ranges from loam to grayish-brown recent colluvial and alluvial materials. Small, somewhat poorly drained areas are included, especially where this soil adjoins Manassas, Calverton, and Penn soils. Along the boundaries of Iredell soils and near Brecknock and Kelly soils, this soil has a plastic clay subsoil similar to that of Elbert silt loam, level phase.

Croton silt loam, level phase, is strongly to very strongly acid and low to medium in natural fertility and organic matter. It has a low capacity to hold water that

plants can use and a high water table. Permeability is moderate, but the high water table prevents deep air and root penetration. Some type of drainage is generally needed to increase productivity and improve tillage.

Use and suitability.—This soil is mostly in pasture. A large part is idle, and small acreages are in crops and forest. Poor drainage restricts the use of this soil for cultivated crops. Corn and small grain are grown on small areas, but many failures occur each year. The best use is for pasture. Alfalfa is not suited to this soil, but ladino clover, fescue, bluegrass, white clover, and many other kinds of grass and legumes grow well. Lime, complete fertilizer, and some ditch drainage are needed for good pasture. Some areas probably could be drained by tiling and could be used for row crops.

Croton silt loam, undulating phase (Czo) (Capability unit IVw-1).—This soil differs from Croton silt loam, level phase, mainly in having slightly stronger slopes and in being slightly better drained in places. Runoff is slow, and internal drainage is very slow to slow. Most slope gradients are about 3 percent. The soil occurs principally around the heads of drainageways. It is easy to conserve but has poor to very poor tilth.

Use and suitability.—Most of this soil is idle or pastured. The rest is forested or cultivated. The management practices are similar to those used on the level phase. Similar management is required to improve this soil.

Dyke series

The Dyke series consists of red, well-drained, productive soils. The surface soil is brown to reddish-brown silt loam to silty clay loam, and the subsoil is red silty clay and clay. The parent material is weathered from greenstone. It is red, yellowish-red, reddish-yellow, and yellow silty clay loam and contains many weathered, yellowish greenstone fragments and hard pieces of quartzite gravel. Loose stones and cobbles are characteristic of these soils. Dyke soils resemble the Hiwassee soils of the stream terraces, but they have different parent material and, in most places, a shallower profile.

Dyke cobbly silty clay loam, undulating phase (Da) (Capability unit IIe-2).—This deep to very deep, red soil has developed in old colluvial beds that originated from greenstone. Runoff and drainage are medium. Large areas along the foot slopes of the Blue Ridge in the Piedmont Upland area overlie granodiorite. Smaller areas along the foot slopes of the Catoctin Mountain overlie limestone of the Triassic Lowland north of Leesburg. This soil is associated with Unison, Rohrersville, and Elbert stony soils of the colluvial lands, and with Chester, Eubanks, Brandywine, and Athol soils of the uplands. Areas are in the Dyke-Unison-Elbert soil association.

Profile in a cultivated area:

Surface soil—
0 to 7 inches, reddish-brown or dark reddish-brown, friable, heavy silt loam to light silty clay loam; moderate, medium, granular structure; angular fragments of quartz and greenstone common.

Subsoil—
7 to 30 inches, red or dark-red, firm silty clay or clay (slightly plastic and sticky when wet); moderate, medium to coarse, subangular blocky peds that break easily to strong, fine, subangular blocky or coarse, granular peds; concretions and pieces of basic rock scattered throughout.
30 to 45 inches, dominantly red, friable silty clay or clay (slightly plastic and sticky when wet); faint mottles of yellowish red and light yellowish brown; weak, fine to medium, subangular blocky peds that crush easily to weak, fine, granular peds; many black concretions and yellowish streaks; weathered basic rock fragments common.

Parent material—
45 to 70 inches, friable silty clay loam mottled with red, yellowish red, and yellow; mixed with many weathered basic rock fragments of similar colors; many black streaks and concretions and hard rock fragments in the lower part.

In many places there is a subsurface layer 3 to 10 inches thick. The subsoil ranges from 8 to 60 inches in thickness. The subsoil is exposed in many small eroded spots. A few to many cobbles are on the surface. Embedded boulders are exposed in places. A few small areas of the associated Unison and Meadowville soils are included.

This soil is medium to strongly acid and has a moderate amount of organic matter. It has medium to high natural fertility. It is very retentive of added plant nutrients and has a high to very high capacity to hold water that plants can use. The permeability is moderately rapid in the surface soil and moderate in the subsoil. Roots penetrate all layers easily, and the soil is well aerated. The hazard of erosion is slight to moderate. Cobbles interfere with tillage, but the soil is fairly easy to work and conserve.

Use and suitability.—Nearly all of this soil is cultivated. A small part is in permanent pasture. Practically all the soil has been improved through good management practices. Rotations are commonly 4 to 6 years in length, although shorter rotations could be used. Corn, small grain, and mixed hay are grown in most rotations. Alfalfa grows well for a long time before it has to be reseeded. The acreage of this crop is increasing in the county. Orchardgrass is commonly grown for seed in the longer rotations. It is pastured each year after the seed is harvested.

This soil is well suited to corn, small grain, alfalfa, and other hay crops. Lime, especially for legumes, and phosphate are perhaps needed most. Needs for potash and nitrogen depend mostly on the crops grown and the intensity with which the soil has been cropped. Good response to manure and crop residues can be expected, especially on the eroded areas. However, this soil makes less response to nitrogen, manure, or other organic matter than some of the coarser textured, less fertile soils.

Dyke cobbly silty clay loam, eroded rolling phase (Db) (Capability unit IIIe-3).—This soil differs from Dyke cobbly silty clay loam, undulating phase, by having stronger slopes, slightly thinner soil layers, and more erosion. From half to all of the surface soil layer has been lost.

Runoff is rapid, and internal drainage is medium. Permeability throughout the soil layers is moderate. The capacity to hold water that plants can use is moderate to high but is slightly less favorable than that of the undulating phase. This soil is more erodible than the undulating phase; a few gullies have formed. Plowing exposes the subsoil, and red eroded areas are conspicuous.

Use and suitability.—A large part of this soil is cultivated. Management is similar to that of Dyke cobbly silty clay loam, undulating phase. However, more control of erosion is needed, especially if row crops are grown. Contour tillage and use of more sod crops in the

500057—60——6

rotation are good practices. Terracing is not feasible.

The range in suitability for crops is medium. This soil is more droughty and has lower yields than the undulating phase. It is difficult to work and conserve but responds well to good management, especially to the use of manure and crop residues.

Elbert series

The Elbert series consists of prominently mottled, poorly drained soils on flats. They have a grayish-brown to dark-gray, heavy silt loam surface soil, generally mottled with strong brown and yellow. The sticky plastic subsoil is mottled with gray, brownish yellow, and strong brown. Most areas are stony. Fragments of greenstone and quartzite occur throughout the profile. The Elbert soils resemble the Croton and Worsham soils in color and position but have a heavier, more sticky, extremely plastic subsoil and different parent material. They are associated with the Dyke, Unison, and Rohrersville soils.

Elbert silt loam, level phase (Ec) (Capability unit IVw-1).—This gray, poorly drained soil is locally known as wet land or crawfish land. It occurs in widely scattered areas throughout the Triassic Lowland. It has formed from weathered products of diabase and syenite on upland flats and in local colluvial and alluvial materials around drainageways. Runoff and internal drainage are very slow. Water is ponded on some of the more nearly level areas during wet seasons. The native vegetation, which differs from that of the surrounding areas, is water-tolerant trees, shrubs, and grasses. This soil is associated with the Iredell, Mecklenburg, Kelly, and Montalto soils. Areas are in the Iredell-Mecklenburg-Rocky land soil association.

Profile in a cultivated area:

Surface soil—
- 0 to 9 inches, light olive-brown, friable silt loam faintly mottled with light gray; moderate, fine to medium, granular structure.

Subsoil—
- 9 to 13 inches, plastic clay mottled with light gray, strong brown, yellow, and brownish yellow; strong, medium, blocky structure.
- 13 to 29 inches, very plastic clay prominently mottled with light gray, strong brown, brownish yellow and yellowish brown; structureless (massive); some small black concretions and films.
- 29 to 39 inches, slightly plastic fine sandy clay prominently mottled with light yellowish brown, yellowish red, strong brown, and gray; moderate, medium, subangular blocky structure.

Parent material—
- 39 to 64 inches, brown, strong-brown, brownish-yellow, and light olive-brown friable coarse sandy loam composed of diabase rock material.

In most places the second layer of the subsoil is dominantly olive brown and yellowish brown. In some areas along drainageways, the soil is deeper than normal and somewhat gravelly. In addition, the surface soil is darker and the subsoil is less plastic and sticky. Some small areas of this soil have layers of brown and black mineral concretions, 10 to 16 inches beneath the surface. In areas associated with Kelly soils, the first subsoil layer is thicker and less plastic than elsewhere. A few somewhat poorly drained areas are adjacent to the better drained Montalto and Mecklenburg soils.

This soil ranges from neutral to strongly acid. Generally, the lower subsoil layers and the parent material are neutral to slightly acid. The content of organic matter is low to fairly high, and the capacity to hold water that plants can use is low to moderate. The natural fertility is medium to high. The surface soil is moderately to slowly permeable, and the subsoil is very slowly permeable. The soil retains plant nutrients well. However, because of the high water table and the plastic subsoil, this soil is hard to work, very low in productivity, and limited in the variety of crops that can be grown.

Use and suitability.—About 50 percent of this soil is in permanent pasture, between 35 and 45 percent is in forest, and the rest is in crops. The cropped areas are generally small and occur in large, better drained fields. Corn and most grain crops on these areas are too poor for harvesting, except where the soil has been drained.

Although this soil is fairly fertile, easy to conserve, and not erodible, it is too wet for row crops unless drained. It is best for permanent pasture. Runoff is very slow. The water table is generally high. Some of the acreage along drainageways is flooded after hard rains. Pasture practices include use of phosphate and potash fertilizers, clipping of undesirable herbage, grazing control, and draining the wetter areas.

Elbert silt loam, undulating phase (Eb) (Capability unit IVw-1).—This soil is essentially the same as Elbert silt loam, level phase, but it has slightly stronger slopes and is mostly on upland flats. Most slopes are less than 4 percent; many are 2 and 3 percent. Runoff is very slow to slow, and internal drainage is very slow. The hazard of erosion is none to slight. Drainage is slightly better than on the level phase. Areas are in the Iredell-Mecklenburg-Rocky land soil association.

Use and suitability.—About equal acreages of this soil are in pasture and forest. A small part is cultivated. Management practices are similar to those used on the level phase. Management requirements are also similar, although this soil has less need of drainage. Excellent pasture of bluegrass and whiteclover has been grown where only moderate fertility has been maintained. Ladino clover and fescue grow well.

Elbert stony silt loam, colluvial phase (Ec) (Capability unit IVw-1).—This poorly drained, gray soil occurs near drainageways along the foot of the Blue Ridge on nearly level to low, gently undulating relief. It overlies beds of old colluvial material derived from greenstone. Loose stones and cobbles are on the surface and in the profile. Runoff is very slow to slow, and internal drainage is very slow. This soil has a slightly coarser textured subsoil and has developed from different parent material than Elbert silt loam, undulating phase. Areas are in the Dyke-Unison-Elbert soil association.

Profile in a pastured area:

Surface soil—
- 0 to 7 inches, dark grayish-brown to yellowish-brown, friable to firm silt loam to silty clay loam; moderate, medium to coarse, subangular blocky structure that crushes with difficulty to strong, granular structure; loose greenstone and quartz fragments are common.

Subsoil—
- 7 to 12 inches, olive-gray to gray, friable silty clay loam; strong, fine, subangular blocky structure.
- 12 to 28 inches, dominantly yellowish-brown very plastic clay mottled with olive gray and brownish yellow; structureless (massive); many greenstone fragments.

28 to 36 inches, brownish-yellow, plastic sandy clay or clay containing a few gray mottles; structureless (massive); many pieces of gravel.

Underlying material—

36 inches +, quartz and greenstone gravel mixed with silty clay loam and clay soil material; mottled with shades of yellow, olive, brown, and gray.

Mineral concretions are common on the surface and in the profile in some places. The surface soil ranges from yellowish brown to dark gray in color but is mottled in most places with gray, strong brown, and yellowish brown. It ranges in texture from silt loam to silty clay loam. When the silty clay loam surface soil is dry, it cracks and has strong, coarse, blocky structure or is structureless (massive). The clay loam to clay subsoil is dominantly yellowish brown to light brown and has very fine to fine gray mottles. In some places the subsoil has many mottles of gray, yellow, and brown. The thickness and sequence of the profile layers vary a great deal and depend on the character of the land on which the colluvial materials were deposited. Some areas are reached by stream overflow.

Elbert stony silt loam, colluvial phase, ranges from neutral to strongly acid but is generally medium acid. It is moderate to high in organic matter and medium to high in fertility. The hazard of erosion is none to slight, and the capacity to hold water that plants can use is low to moderate. The surface soil is moderately permeable, and the subsoil is very slowly to slowly permeable. The water table is near the surface except in dry seasons. The soil is hard to work and is suited to only a limited variety of crops.

Use and suitability.—Nearly all of this soil is in permanent pasture. It is well suited to pasture plants, such as fescue, ladino clover, bluegrass, and white clover. Management practices are similar to those of the associated Unison and Rohrersville soils. This soil could be improved by removing loose stones.

Elioak series

The Elioak series consists of well-drained, deep, friable soils on undulating, rolling, and hilly relief. They have a brown silt loam surface soil and strong-brown to yellowish-red, micaceous parent material.

Elioak silt loam, undulating phase (Ed) (Capability unit IIe-2).—This is a well-drained upland soil. It is not extensive but occurs in rather large tracts. It has developed from weathered products of quartz sericite schist on undulating interstream divides and ridges. Runoff and internal drainage are medium. This soil is associated with Glenelg, Manor, Meadowville, and Worsham soils.

Profile in a cultivated area:

Surface soil—

0 to 7 inches, yellowish-brown to brown, very friable silt loam; weak, fine to medium, granular structure; a few quartz and schist fragments; few very small mica flakes; in wooded areas the surface soil is dominantly pale brown and the topmost inch is dark grayish brown.

Subsoil—

7 to 13 inches, yellowish-red, friable, light silty clay loam; moderate, fine to medium, subangular blocky structure; few finely divided mica flakes.

13 to 32 inches, red, friable to firm silty clay loam; strong, medium, subangular blocky structure; many fine mica flakes. The lower part is multicolored and very friable, and 15 to 25 percent of its mass is mica flakes; black mineral films and streaks, and quartz and schist fragments, are common.

Parent material—

32 to 60 inches, very friable, highly micaceous light silt loam mottled with red, light reddish brown, yellow, reddish yellow, light gray, and black; weak platy structure similar to that of the underlying schist rock; many quartz and schist fragments.

The surface soil is very pale brown when dry and yellowish brown to brown when wet. In cultivated areas where much organic matter has been applied, it is brown or dark reddish brown. The texture of the surface soil ranges from very fine sandy loam to silt loam, and that of the subsoil from silty clay loam to a light silty clay. In many places small angular fragments of quartz gravel and schist are on the surface and embedded in the profile. The total thickness of the surface soil and subsoil down to the parent material ranges from 16 to 56 inches but averages about 30 inches. The parent material is generally more than 5 feet thick, except where there are narrow strata of hard schist and veins of quartz.

Nearly all of the cleared soil is slightly to moderately eroded, and in places the subsoil has been exposed by plowing. Included in this mapping unit are very small areas of reddish-brown soil, which is similar to Fauquier silt loam and Montalto silt loam and was derived from basic rock.

This soil is strongly to very strongly acid, relatively low in organic matter, low in natural fertility, and moderately erodible. It retains added plant nutrients well and responds readily to fertilizer. Although more lime is required than for Glenelg or Manor soils, this soil retains lime longer. Permeability is moderately rapid in the surface soil and moderate in the subsoil. The capacity to hold water that plants can use is high. This soil is easy to work and conserve. It is productive of most local crops.

Use and suitability.—About 80 percent of this soil is cultivated, and the rest is in forested, pastured, and idle areas. Rotations lasting 4 to 6 years are generally used. A common rotation is corn followed by small grain and clover or mixed hay crops. Another rotation consists of alfalfa generally sown after corn or small grain and then left 3 to 6 years before the land is planted anew to corn or other crops. In the longer rotations, orchardgrass is grown for seed the last 2 or 3 years of the rotation. After orchardgrass is cut for seed, the field is grazed. This soil is well suited to corn, small grain, and most hay crops, including alfalfa, red clover, ladino clover, lespedeza, timothy, and orchardgrass.

Good crop production is limited by the acidity of this soil, and lime should be used to raise the pH value to 6.0 or 6.5. Nitrogen and phosphorus are limiting factors. Potash (K_2O) may be needed if a field has low fertility from continuous cultivation or from growing alfalfa or other crops. This soil generally has low fertility. It responds, however, to lime and fertilizer and especially to the use of manure and crop residues.

Elioak silt loam, rolling phase (Ee) (Capability unit IIIe-2).—This soil is similar to Elioak silt loam, undulating phase, but has stronger slopes and a somewhat shallower profile. Runoff is medium to rapid, and internal drainage is medium. This soil is more erodible than the undulating phase, and some areas have lost much surface soil. A few shallow gullies have formed. Included with this soil are small areas that have a dark-brown surface

soil and a red subsoil overlying narrow strata of dark-colored basic rock.

Use and suitability.—A large part of this soil is used for crops and pasture. Management is similar to that of the undulating phase. However, more erosion control practices are needed. These include contour cultivation, use of sod crops and longer rotations, and perhaps some stripcropping, especially for row crops.

This soil is suitable for a medium to wide variety of crops. It is fairly easy to work and conserve and responds well to good management.

Elioak silt loam, hilly phase (Ef) (Capability unit VIe–1).—This soil has stronger slopes and a shallower profile than Elioak silt loam, undulating phase, but it is otherwise similar. Runoff is rapid, and internal drainage is medium. Under similar management, this soil is more erodible than the undulating and rolling phases of Elioak silt loam, and many areas have lost most of their surface soil. A few shallow and deep gullies have formed in places.

Use and suitability.—A large part of this soil has been cleared and is used for pasture and hay crops. Management practices for permanent pasture are mainly close grazing, occasional clipping, liming, light fertilization, and top dressing with manure on the more severely eroded areas. If cultivated, the soil is managed like the rolling phase, except that more sod crops are grown in the rotation on some farms.

Mainly because of its slopes and erodibility, this soil is difficult to work and conserve. It is best suited to permanent pasture or forest. Special practices are needed to conserve soil and water on cultivated areas. This soil responds well to good management and can be kept productive if used for permanent pasture.

Elk series

The Elk series consists of soils along the Potomac River that have formed from alluvium washed principally from uplands underlain by limestone. The surface soil is a brown loam. The subsoil is a yellowish-brown to strong-brown clay loam, silty clay loam, or fine sandy clay loam. The underlying material consists of silty clay loam to silt loam and loam layers, which are mottled with strong brown, yellowish red, light gray, brown, and black. This material has many rounded pieces of gravel and other rock fragments in the lower part. The Elk soils are associated with the Captina, Sequatchie, Robertsville, and Huntington soils. Only one soil of the Elk series is mapped in the county.

Elk loam (Eg) (Capability unit IIe–3).—This deep to very deep, brown, fertile soil occurs on low stream terraces along the Potomac River. It has formed from mixed alluvium that washed principally from uplands underlain by limestone. It resembles Sequatchie loam but has better development, is finer textured, and is slightly lighter in color throughout. Slopes range from 2 to 7 percent, but most of them are not greater than 3 percent. Runoff is slow to medium, and internal drainage is medium to slow. This soil is associated with Sequatchie, Captina, and Robertsville soils. It occurs on higher positions than the associated soils and is generally 60 feet or a little more above the present stream beds. Areas of this soil are in the Captina-Robertsville-Elk soil association.

Profile in a cultivated area:

Surface soil—
0 to 7 inches, brown, very friable loam to silt loam; moderate, medium, granular structure.

Subsoil—
7 to 12 inches, strong-brown, friable light silty clay loam; moderate, medium, subangular blocky structure.
12 to 21 inches, strong-brown, firm silty clay loam; moderate, medium, subangular blocky structure.
21 to 42 inches, dominantly strong-brown, friable to firm, slightly compact silty clay loam; many, medium to coarse, distinct mottles of very pale brown, yellowish red, very dark gray, or black; weak, medium, subangular blocky to weak platy structure.

Underlying material—
42 to 50 inches, silt loam to silty clay loam with mottles of yellowish red, strong brown, pale brown, and black; weak, fine to medium, subangular blocky structure; some platy structure.

The texture of the surface soil ranges from loam to silt loam, and that of the subsoil ranges from light silty clay loam to clay. Much of this soil is moderately well drained, is lighter in color than normal, and has distinctly mottled, compact, platy layers below 24 inches. It resembles Altavista loam (not mapped in this county) in color and drainage.

Elk loam is medium acid throughout the profile. It is medium to high in natural fertility and organic matter. The hazard of erosion is slight. The capacity of this soil to hold water that plants can use is high. Added plant nutrients are well retained. Permeability is moderately rapid in the surface soil and moderate in the subsoil. The soil is easy to work and conserve and highly productive of most local crops.

Use and suitability.—Most of the soil is cultivated; the rest is in cutover woods and permanent pasture. Crop rotations are generally 3 or 4 years in length. A common rotation is corn followed by small grain and mixed hay crops.

This soil is well suited to most local crops, including corn, wheat, barley, oats, rye, soybeans, and sorghum and all hay and forage crops. Some areas are not well suited to alfalfa, because of slow internal drainage. Stands do not last long. If legumes are grown, crop residues ought to be turned under and manure, phosphate, and lime applied. Nitrogen and potash, if not supplied through manure and legumes, will be needed on certain crops, especially if short rotations that include many row crops are used.

Emory series

The Emory series consists of soils on undulating relief. They have developed from fine material washed mostly from Athol soils. The thick surface soil is brown to dark-brown silt loam. The subsoil is a reddish-brown, strong-brown, or yellowish-red silt loam to silty clay loam. The parent material is heavy silt loam with fine mottles of brownish yellow, red, and strong brown. A few small pebbles occur on the surface and in the parent material. The Emory soils are the most productive and fertile soils of the colluvial lands. Only one soil of the Emory series is mapped in the county.

Emory silt loam (Eh) (Capability unit IIw–1).—This brown, friable soil has developed from recent local colluvial and alluvial material. It occurs at the base of slopes, in depressions along drainageways, and in a few sinks.

Runoff is slow to medium, and internal drainage is medium. The soil receives seepage water from soils in higher areas and remains moist even in dry seasons. Emory silt loam resembles Meadowville silt loam, which was developed from recent colluvial and alluvial materials. It is associated with the Athol soils of the uplands and, to some extent, with the Lindside and Huntington soils of the bottom lands. Areas of Emory silt loam are in the Athol-Emory soil association.

Profile in a cultivated area:

Surface soil—
0 to 14 inches, brown to dark-brown, very friable silt loam; moderate, medium, granular structure; this layer ranges from 8 to 16 inches in thickness.
Subsoil—
14 to 25 inches, reddish-brown, strong-brown, or yellowish-red friable silt loam to silty clay loam; weak, fine, subangular blocky structure.
Underlying material—
25 inches +, reddish-brown to yellowish-red, friable, heavy silt loam; a moderate number of faint, fine mottles of brownish yellow and red.

The subsoil ranges from silt loam to light silty clay loam. Gray and reddish-brown mottles are common below 25 inches in some areas. Gravel occurs on the surface and in the profile in places. A few areas contain soil materials washed from Bucks and Penn soils. Some small areas of Lindside soil are included.

Emory silt loam is generally medium acid to neutral in reaction, but in some places in the lower part of the subsoil it is slightly alkaline. It is high in fertility, in organic matter, and in capacity to hold water that plants can use. Permeability is moderately rapid in the surface soil and moderate to moderately rapid in the subsoil. Emory silt loam is easy to work and conserve and is suitable for a wide variety of crops. There is no risk of erosion, but some areas are flooded in wet seasons.

Use and suitability.—All except a few acres of this soil is cultivated. Management practices are similar to those for Athol silt loam, undulating phase. Most areas are fertilized lightly, but yields of corn, mixed hay, and clovers are good. Good tilth, excellent moisture conditions, and high fertility make this soil one of the most productive in the county. Yields could be increased by shorter rotations and proper fertilizer, since the soil is suited to intensive use. Corn, clovers, and mixed hays are the most suitable crops, but alfalfa and small grains are grown successfully. Alfalfa seedings are not durable because of the moist soil, but the stands produce large yields for several years. Phosphate is perhaps needed most on this soil. Lime is not needed for many crops, but legumes may require small amounts.

Eubanks series

The Eubanks series consists of well-drained, deep, reddish soils on undulating and rolling relief. They are mapped only as soil complexes with Chester soils. The surface soil of the Eubanks series is brown loam to fine sandy loam. The subsoil is red sandy clay loam to silty clay loam. Eubanks soils have cobbles and stones throughout the profile in many areas. In general, the relief of the Eubanks-Chester complexes is more rolling than that of the Chester soil alone.

Eubanks-Chester loams and silt loams, undulating phases (Ek) (Capability unit IIe–2).—This complex contains areas of Eubanks, Chester, and Montalto soils so intricately associated that they cannot be mapped separately at the scale used. These soils were derived from weathered, variable granodiorite. The parent materials of the Eubanks and Chester soils are from medium- and coarse-grained basic and acidic rocks. The parent material of the Montalto soil is from fine-grained basic rock. The depth of this complex ranges from 5 to 18 feet but averages about 10 feet. The soils of this complex are well drained. Runoff and internal drainage are medium.

This complex differs from the Chester loam and silt loam mapping units by having a slightly coarser textured profile, more choppy and broken relief, more variable and different parent materials, shallower depth over bedrock, and more local gravel, cobbles, and rock outcrops.

The rather large acreage of Eubanks-Chester loams and silt loams, undulating phases, occurs in a moderately wide valley, north and south of Round Hill in the western part of the county near the Blue Ridge. Small areas of excessively drained Brandywine sandy loam are included with this complex of soils, along with many transitional soils that have characteristics intermediate between Eubanks and Chester soils. This complex is associated with the Brandywine, Belvoir, Meadowville, Worsham, and other Chester soils of the uplands and with Dyke and Unison soils of the colluvial lands. Areas are in the Eubanks-Chester soil association.

Profiles of Eubanks loam, undulating phase, and Montalto silt loam, undulating phase, follow. A representative profile of Chester loam, undulating phase, is given elsewhere in this report.

Profile of Eubanks loam, undulating phase, in a cultivated area:

Surface soil—
0 to 9 inches, yellowish-brown to brown, very friable loam to coarse sandy loam; weak, fine to medium, granular structure.
Subsoil—
9 to 15 inches, strong-brown to yellowish-red, friable loam to light fine sandy clay loam; weak, fine to medium, subangular blocky structure.
15 to 45 inches, red fine sandy clay loam to silty clay loam; friable, firm, slick, and heavy; strong, medium to coarse, subangular blocky structure; few yellow and black specks and many small mica flakes and pieces of quartz gravel.
45 to 51 inches, friable light sandy clay loam to sandy loam mottled with red, very pale brown, yellowish red, and reddish yellow; weak, fine to medium, subangular blocky structure; many small mica flakes and pieces of quartz gravel.
Parent material—
51 to 66 inches +, very friable coarse sandy loam mottled with very pale brown, white, red, strong brown, reddish yellow, and light olive brown; developed from weathered products of acidic granodiorite; few pockets of sandy clay loam.

Wide variations in the texture and mineral composition of the underlying rocks cause most of the variations in the soil. The surface soil ranges from loam to coarse sandy loam, and the subsoil from light sandy clay loam to heavy silty clay loam or heavy clay loam. The thickness of the subsoil varies greatly. A few bedrock outcrops, cobbles, and stones occur locally but do not interfere with cultivation.

Profile of Montalto silt loam, undulating phase, in a cultivated area:

Surface soil—
0 to 7 inches, brown, friable silt loam; medium to coarse, granular structure; contains a few small fragments of granodiorite and quartz.
Subsoil—
7 to 12 inches, yellowish-red, friable, light silty clay loam; moderate, fine, subangular blocky structure.
12 to 26 inches, red, firm clay; moderate, medium to coarse, subangular blocky structure; few black specks or mineral concretions.
26 to 31 inches, yellowish-red, friable, light silty clay loam with faint, medium mottles of strong brown; many black specks.
Parent material—
31 inches +, friable, weathered material from fine-grained, basic granodiorite; mottled with yellowish red, strong brown, and yellow.

In some places the upper subsoil layer is thicker than that of the profile described; in others it is absent. The thickness of the subsoil ranges from 8 to 30 inches but is generally about 20 inches. Much surface soil has eroded in places, and the red subsoil shows on plowing.

The soils of the Eubanks-Chester complex are mostly medium to strongly acid, moderate in organic matter, and medium in fertility. They are slightly to moderately erodible. Permeability is rapid in the surface soil and moderate to moderately rapid in the subsoil. The soils retain added plant nutrients, except in a few of the sandier areas, and they have moderate to high capacity to hold water that plants can use. They are easy to work and conserve. The soils are good to very good for all crops of the area.

Use and suitability.—All of the acreage of this complex is cultivated, except for a few areas in woodlots and in permanent pasture. Management practices, including rotations and crops grown, are similar to those on Chester loam and silt loam, undulating phases. This complex is suitable for all local crops.

Eubanks-Chester loams and silt loams, rolling phases (Em) (Capability unit IIIe-2).—This complex is similar to Eubanks-Chester loams and silt loams, undulating phases, but has stronger slopes, shallower profiles, more erosion, and more local outcrops and loose stones. It includes slightly more of the shallow, excessively drained Brandywine soils. Runoff is medium to rapid, and, except in the sandier areas, internal drainage is medium.

A small acreage of Montalto silt loam, rolling phase, and Eubanks-Chester loams and silt loams, hilly phases, not mapped separately in the county, have been included with this mapping unit.

Use and suitability.—Most of the acreage of Eubanks-Chester loams and silt loams, rolling phases, is cultivated. Management is similar to that of Eubanks-Chester loams and silt loams, undulating phases. Simple methods of erosion control, such as contour cultivation, more sod crops in the rotation, or longer rotations, are needed, particularly if row crops are grown. The soils of this complex are fairly easy to work and conserve and respond to good management. They require fertilizer.

Eubanks-Chester stony loams and silt loams, undulating phases (En) (Capability unit IIIs–1).—This complex differs from Eubanks-Chester loams and silt loams, undulating phases, principally in being somewhat shallower to bedrock. Also, it has enough loose stones, cobbles, and bedrock outcrops to make cultivation difficult. Loose stones and cobbles, 3 to 12 inches in diameter, occupy about 15 percent of the surface in most places. A few outcrops of granodiorite occur. Runoff and internal drainage are medium, except in a few areas of the included Brandywine soils. This stony complex is associated with the nonstony complexes of Eubanks-Chester loams and silt loams, with Brandywine, Belvoir, Worsham, and Meadowville soils, and to a lesser extent with the Dyke and Unison soils of the colluvial lands.

Use and suitability.—This complex is used chiefly for crops and pasture. Small parts are idle or in trees, chiefly woodlots. Crops and management are similar to those for Eubanks-Chester loams and silt loams, undulating phases. Stoniness, however, limits the use for crops and pasture. The soil is only fairly easy to work or to conserve, but it responds well to manure, crop residue, lime, and fertilizer.

Eubanks-Chester stony loams and silt loams, rolling phases (Eo) (Capability unit IIIs–1).—This complex has developed from weathered products of varied granodiorite. It occurs on slopes leading from smooth upland ridgetops. It differs from Eubanks-Chester stony loams and silt loams, undulating phases, by having stronger slopes and shallower profiles over bedrock. The soils are not as easy to work and conserve as Eubanks-Chester stony loams, undulating phases, because of their steeper slopes. Runoff is more rapid, and the hazard of erosion is greater. These soils are associated with other Eubanks and Chester soils and with Belvoir, Worsham, and Meadowville soils.

Use and suitability.—Most of the acreage is in crops and permanent pasture. Practically all of the rest is idle or in forest. Present use and management needs are similar to those of Eubanks-Chester loams and silt loams, rolling phases. In some places this stony, rolling complex can be used best for permanent pasture.

Eubanks-Chester stony loams and silt loams, hilly phases (Ep) (Capability unit VIs–2).—This inextensive complex of soils has developed from residual products of a variably textured granodiorite and occurs in deeply dissected areas near larger streams in the Piedmont Upland area. This complex differs from the rolling and the undulating phases of Eubanks-Chester stony loams and silt loams, with which it is associated, by having stronger slopes and thinner profile layers in places. In addition, hilly slopes and stoniness make it less productive and less suitable for most crops. Severe sheet and gully erosion damages the unprotected soil. Runoff is rapid, and internal drainage is medium, except in the included areas of excessively drained Brandywine soil. This complex is medium to strongly acid in most places.

Use and suitability.—Most of the acreage is used for pasture. The rest is in cropped, forested, and idle areas. These hilly phases are the least productive of all the Eubanks-Chester soils. The cultivated soils are difficult to work and conserve and are best suited to permanent pasture in most places. Management of cultivated areas is similar to that of the undulating and rolling phases of Eubanks-Chester loams and silt loams. Erosion should be controlled by stripcropping, contour cultivation, and long rotations that contain mostly sod or close-growing crops. These hilly phases respond well to good manage-

ment. If used for permanent pasture or close-growing crops and properly fertilized, they can be kept highly productive.

Fauquier series

The Fauquier series consists of well-drained, moderately deep soils on undulating, rolling, and hilly relief. They are severely eroded in places. The surface soil is brown to reddish-brown silt loam. The subsoil is red silty clay to clay. The parent material is red, strong-brown, and yellow chloritic greenstone soil material. Fauquier soils resemble those of the Montalto series.

Fauquier silt loam, undulating phase (Fc) (Capability unit IIe-2).—The reddish color of this well-drained, moderately deep soil distinguishes it from its associated Myersville and Catoctin soils. It occurs in small, widely scattered areas, mainly on smooth, high ridgetops along the Catoctin and Hogback Mountains. It has developed from weathered greenstone. Runoff and internal drainage are medium. This soil resembles Montalto silt loam, undulating shallow phase, but has developed from different parent material and has more clay in the subsoil. Areas of this soil are in the Myersville-Catoctin-Fauquier soil association.

Profile in a cultivated area:

Surface soil—
0 to 7 inches, reddish-brown to brown, very friable silt loam; moderate, medium, granular structure.

Subsoil—
7 to 24 inches, red, firm to friable silty clay to clay; slightly plastic when wet and hard when dry; moderate, medium to coarse, subangular blocky structure; black streaks are common on cut surfaces.
24 to 34 inches, dominantly red, friable silty clay loam mottled with strong brown and reddish yellow; weak, medium, subangular blocky structure; many greenstone fragments and black films and a few finely divided mica flakes.

Parent material—
34 to 50 inches, mottled yellowish, greenish, and reddish weathered greenstone containing a small quantity of silt loam; few mica flakes.

The surface soil ranges from brown to dark reddish brown in color and from 4 to 10 inches in thickness. The thickness of the subsoil ranges from 6 to 40 inches but is generally about 22 inches. Nearly all the soil is slightly to moderately eroded, and the subsoil is exposed in places. Southwest of Aldie a fairly large area mapped as Fauquier silt loam, undulating phase, is slightly coarser in texture. It was derived from weathered, mixed greenstone schist and sericite schist. The subsoil contains more fine mica and less clay. In places the parent material is highly micaceous.

This soil is medium to strongly acid, moderate in organic matter, medium in fertility, and high in capacity to hold water that plants can use. It requires more lime to raise the pH to a given level than the coarser textured soils. The soil retains added plant nutrients. Permeability is moderately rapid in the surface soil and moderate in the subsoil. The soil responds well to good management. It is easy to work and fairly easy to conserve. The production is good.

Use and suitability.—Nearly all of this soil is cultivated. Rotations lasting 4 to 6 years are in general use. A common rotation is corn, small grain, and hay. In the longer 5- to 6-year rotations, corn is followed by small grain. Then, orchardgrass is grown for seed 2 or 3 years. Alfalfa is grown in rotations or alone. Much of it is sown with small grain, generally with oats in the spring. Corn and small grain follow alfalfa.

This soil is well suited to corn, sorghum, barley, oats, wheat, rye, alfalfa, red clover, and most hay and forage crops. Some garden vegetables grow well, but not so well as on the coarser textured soils such as the Chester-Brandywine loams and sandy loams, undulating phases. The acid soil limits the yields, especially of alfalfa and other legume crops. Lime must be applied to raise the pH to a desired level (6.0 to 6.5). Nitrogen can be supplied through legumes and organic matter. Phosphate is perhaps the most needed plant nutrient. Potash is needed for legumes in the rotation and for corn if sufficient manure is not available. The soil responds well to good management. It has medium natural fertility.

Fauquier silt loam, rolling phase (Fb) (Capability unit IIIe-2).—This soil has stronger slopes and thinner profile layers than Fauquier silt loam, undulating phase. It occurs on rolling ridgetops and slopes leading from smooth ridges. Runoff is medium to rapid, and internal drainage is medium. This soil is more erodible than the undulating phase, and more of the surface soil has been removed. A few shallow gullies have formed in places.

Use and suitability.—This soil is mostly in crops and pasture. Small parts are in cutover woodland and idle areas. Management is similar to that of Fauquier silt loam, undulating phase, but more control of erosion is needed because of the stronger slopes. This soil has moderate capacity to hold water that plants can use. It is fairly easy to work and conserve and produces good yields.

Fauquier silt loam, hilly phase (Fc) (Capability unit VIe-1).—This soil has stronger slopes, thinner soil layers, and shallower depth to bedrock than Fauquier silt loam, undulating phase. Runoff is rapid to very rapid, and internal drainage is medium. Most areas are intricately associated with Fauquier silt loam, rolling phase, on high upland ridge slopes and hillsides near larger streams. A small, severely eroded acreage with deep gullies is included.

Use and suitability.—This soil is used equally for crops and pasture. Forested and idle areas make up a small part. Management is similar to that used for the rolling and undulating phases of Fauquier silt loam, except for some stripcropping and longer rotations. Crops and fertilizers are about the same.

Because of its stronger slopes, moderately low capacity to hold water that plants can use, high erodibility, and problems of cultivation, this soil is most suitable for permanent pasture. Conservation practices for the cultivated soil should include stripcropping and the use of sod or close-growing crops in the rotation. The soil responds to good management.

Fauquier stony silt loam, rolling phase (Fk) (Capability unit IIIs-1).—This well-drained, stony soil has formed from residual greenstone material. It occurs on the sides and tops of ridges in the strongly rolling, high uplands. This soil differs from Fauquier silt loam, rolling phase, by having loose greenstone fragments on the surface and embedded in the profile. Tillage is hindered by these fragments, which range from 3 to 12 inches in diameter and cover 10 to 15 percent of the

surface. Rock outcrops and boulders occur locally. Runoff is medium to moderately rapid, and internal drainage is medium. Some small included areas have deep gullies; others have slopes of 2 to 7 percent. This soil is associated with Myersville, Catoctin, and other Fauquier soils. Areas are in the Myersville-Catoctin-Fauquier soil association.

Use and suitability.—This soil is used principally for crops and pasture. A sizable acreage is idle. The soil is well suited to most local crops grown in the area. Because of the stoniness of this soil, the variety of crops that can be grown is more limited than on the nonstony types. Control of erosion is needed, as well as lime and complete fertilizer or fertilizers containing phosphorus and potassium. The soil is not so easy to work and manage as the nonstony types, but it responds well to good management.

Fauquier stony silt loam, hilly phase (Fm) (Capability unit VIs–2).—This soil occurs in the uplands on the slopes and tops of ridges. It has stronger slopes, is shallower to bedrock, and is more erodible than Fauquier stony silt loam, rolling phase. Runoff is rapid to very rapid, and internal drainage is medium. A small, deeply gullied acreage is included.

Use and suitability.—Most of the acreage was once cultivated, but it is now used mainly for permanent pasture. Some areas are idle or are in cutover forest. A small part is cultivated. This soil is somewhat less suitable for pasture than the rolling phase. It is, however, naturally fairly productive of good pasture plants. Most pasture has not been fertilized properly and is mostly a mixture of broomsedge, bluegrass, whiteclover, and many undesirable grasses and weeds. In pastures that have been limed, fertilized, and properly grazed, the vegetation is mainly bluegrass and whiteclover. The carrying capacity of these pastures is high.

Fauquier silty clay loam, eroded undulating phase (Fd) (Capability unit IIIe–3).—This red, upland soil has developed from weathered greenstone. It is more eroded than Fauquier silt loam, undulating phase. Most areas have lost 75 percent or more of the surface soil, and a few shallow gullies have formed. Plowed layers are mostly silty clay loam subsoil material. Runoff is medium to moderately rapid, and internal drainage is medium.

The soil is medium to strongly acid, medium in fertility, low in organic matter, and moderate in capacity to hold water that plants can use. Permeability of the surface soil and subsoil is moderate. The soil is only fairly easy to work and conserve.

Use and suitability.—Most of this soil is cultivated. Management is similar to that of Fauquier silt loam, undulating phase, but more manure and crop residues are used on some of the more eroded areas. Organic matter (manure and crop residues), lime, phosphate, and potash, in that order, are the major needs for good yields. This soil responds to good management and is suited to a moderately wide range of crops.

Fauquier silty clay loam, eroded rolling phase (Fe) (Capability unit IIIe–3).—This soil is similar to Fauquier silty clay loam, eroded undulating phase, in most characteristics, but it has stronger slopes and is slightly shallower to bedrock. This soil is more subject to erosion than the eroded undulating phase. It includes a small deeply gullied acreage. Runoff is rapid, and internal drainage is medium. This soil is difficult to work and conserve.

Use and suitability.—Nearly all of this soil has been cleared and cultivated. Small acreages are in pasture, are in forest, or are idle. The variety of crops that can be produced is more limited than on the eroded undulating phase. Erosion should be controlled by contour cultivation, by use of more sod crops in the rotations, and perhaps by stripcropping. The soil responds well to good management.

Fauquier silty clay loam, eroded hilly phase (Fg) (Capability unit VIIe–1).—Stronger slopes, shallower depth to bedrock, and erosion of 50 to 75 percent of the surface soil distinguish this soil from Fauquier silt loam, undulating phase. Runoff is rapid to very rapid, and internal drainage is medium to slow. Some small acreages of included soils have deep gullies; others have steep slopes of 25 to 45 percent.

Use and suitability.—Nearly all of this soil was once cleared and cultivated. Most of it is now in pasture. Some areas have reverted to forest, and others are idle. A small part is cultivated. This soil is suited to only a limited variety of crops and is best used for pasture or forest. Lime, manure, and a complete fertilizer are needed to establish and to maintain good permanent or temporary pasture.

Fauquier silty clay loam, severely eroded rolling phase (Ff) (Capability unit VIIe–1).—This soil is more severely eroded than Fauquier silty clay loam, eroded rolling phase. Nearly all the surface soil has been lost through erosion, and a few deep and shallow gullies occur generally. The plow layer is chiefly in the reddish silty clay subsoil. Runoff is rapid, and internal drainage is medium. Infiltration is slower than in the eroded phases.

Use and suitability.—Most of this soil is idle or is reverting to forest. It can be used for permanent pasture, but it needs intensive management practices. Its most suitable use is forestry.

Fauquier silty clay loam, severely eroded hilly phase (Fh) (Capability unit VIIe–1).—This soil is similar to Fauquier silty clay loam, eroded hilly phase, but it is more severely eroded. Nearly all, or all, of the surface soil is eroded and deeply gullied. Runoff is very rapid, and internal drainage is medium.

Use and suitability.—Nearly all of this soil is idle or in cutover forest. A few areas are in pasture. Because of its hilly relief and severe erosion, this soil is most suitable for pasture or forest. The pasture is of poor quality. More careful and costly management is required to establish and maintain productive pasture on this soil than on Fauquier silty clay loam, eroded hilly phase. Lime, organic matter, and complete fertilizer are major needs.

Glenelg series

The Glenelg series consists of well-drained, extensive soils mainly on undulating and rolling relief. They have a brown to dark-brown silt loam surface soil and a friable, strong-brown to yellowish-red, heavy silt loam to silty clay loam subsoil. The parent material is very deeply weathered, soft, porus, micaceous, fine-grained schist rock. This rock is light reddish brown, light gray, gray, pink, and yellowish red. The Glenelg soils resemble the Chester silt loam soils in color and texture, but they have formed

over schist rather than granodiorite. They are suited to most crops but are not so productive as the Chester soils. They are associated with the Elioak and Manor soils.

Glenelg silt loam, undulating phase (Ga) (Capability unit IIe–2).—This is a well-drained, moderately deep soil on moderately low upland ridgetops along the Bull Run and Catoctin Mountains. It has developed from quartz sericite schist. This soil differs from Elioak silt loam, undulating phase, with which it is associated, by having a strong-brown to yellowish-red subsoil, slightly thinner profile layers, less clay in the subsoil, and a greater mica content. It has a well-developed profile, in contrast to the associated Manor soils, which have very thin or no subsoil development. It resembles Chester silt loam, undulating phase, but it was derived from different parent material, contains more mica, and has a finer texture. Runoff and internal drainage are medium. Areas of this soil are in the Glenelg-Manor-Elioak soil association.

Profile in a cultivated area:

Surface soil—
0 to 7 inches, brown to yellowish-brown, very friable silt loam; moderate, fine, granular structure; few very fine mica flakes and small quartz pieces; in wooded areas this layer is lighter in color, except in topmost inch.

Subsoil—
7 to 18 inches, yellowish-red to strong-brown, friable silty clay loam; moderate to strong, medium, subangular blocky structure; small mica flakes and small quartz pieces are common; first 2 inches of this layer are slightly lighter in color and coarser in texture.
18 to 24 inches, strong-brown, friable to very friable silt loam; moderate, fine to medium, subangular blocky structure; the upper part of this layer has much quartz gravel and many fine mica flakes, which increase in the lower part.

Parent material—
24 to 36 inches, light reddish-brown, mingled with reddish-yellow and black, very friable, soft, highly micaceous material of weathered quartz sericite schist; material is 80 to 90 percent fine sericite mica particles and varies greatly in color pattern from place to place; a few pieces of quartz gravel and fragments of hard schist.

The surface soil ranges from yellowish brown to dark brown in cultivated areas and from very pale brown to dark grayish brown in wooded areas. The subsoil is dominantly strong brown. It ranges from brownish yellow through yellowish brown and strong brown to yellowish red. Generally, it is lighter colored in wooded areas. Gravel and cobbles on the surface and in the profile interfere with cultivation in places.

Nearly all of the soil, especially in cultivated areas, has been slightly to moderately affected by sheet erosion. The subsoil is exposed in places. A few included areas of very fine sandy loam to loam are underlain by residual, granitized gneiss and arkosic sandstone. Also included are small areas of Elioak and Manor soils and reddish-brown soils derived from weathered basic rocks.

This soil is very strongly acid and low in organic matter. It is medium to low in fertility but rather high in potassium. It retains added plant nutrients fairly well—not so well as Elioak soils, but better than Manor. It has less erosion than Elioak or Manor soils and requires slightly less lime. Permeability is moderately rapid in the surface soil and moderate to moderately rapid in the subsoil. The capacity of this soil to hold water that plants can use is moderate; it is less than that of the Elioak soils and greater than that of the Manor soils. This soil is easy to work and conserve.

Use and suitability.—Glenelg silt loam, undulating phase, is mostly in crops and pasture. A few areas are idle or in forest. Management practices are similar to those of Elioak silt loam, undulating phase, and yields are much the same. This soil is easier to work and conserve than Elioak silt loam, undulating phase. Under good management, it produces most crops locally grown. It produces less, however, than Chester and Athol soils of similar relief and needs more plant nutrients and organic matter.

Glenelg silt loam, rolling phase (Gb) (Capability unit IIIe–2).—This soil has stronger slopes and is shallower to bedrock than Glenelg silt loam, undulating phase. It occurs on narrow, rolling ridgetops and on the sides that extend from smoother ridgetops.

This soil is more erodible than the undulating phase. Some areas have lost much surface soil. Runoff is medium to rapid, and internal drainage is medium. A small acreage with a few shallow or deep gullies is included. Other included areas are similar to those in Glenelg silt loam, undulating phase.

Use and suitability.—Most of the acreage is in crops or pasture. The rest is forested or is idle. Stripcropping is practiced in a few areas. Others are used mainly for hay crops. This soil responds well to good management but is not so easy to work and conserve as the undulating phase. Methods of erosion control, especially in areas where row crops are grown, are contour cultivation, growing of more sod crops, use of longer rotations, and stripcropping on longer slopes.

Glenelg silt loam, hilly phase (Gc) (Capability unit VIe–1).—This soil has steeper slopes, shallower depth to bedrock, and a slightly coarser textured subsoil than Glenelg silt loam, undulating phase. Runoff is rapid, and internal drainage is medium. Inclusions are small and consist of areas of reddish-brown, friable soil that developed from residual material derived from basic rock; some Manor soils; and some areas that have shallow gullies.

Use and suitability.—Most of the acreage is forested, but a fairly large part is in permanent pasture. The rest is in crops or is idle. Pasture management is mostly close grazing, clipping of weeds, light fertilization, liming, and topdressing with manure on the more eroded or thinner areas. Contour tillage and growing of many sod crops in long rotations are practiced on some cultivated areas.

Steep slopes make this soil very erodible and hard to work and conserve. It produces only a limited variety of crops, and it is probably best suited to permanent pasture or forest. The soil responds well to good pasture management. Special practices are needed for row crops.

Hazel series

The Hazel series consists of shallow to deep, brown soils on relief that is mostly hilly and steep. They are droughty and have loose channery and stony areas. Arkosic sandstone and some greenstone material occur as narrow strata in the parent material. The Hazel soils are associated with the Whiteford soils. They are best suited to pasture and forest.

Hazel silt loam, rolling phase (Ha) (Capability unit IVe–2).—This inextensive soil occurs along the foot slopes of the Blue Ridge on the tops and sides of upland ridges. It has developed from weathered phyllite and to some extent from greenstone schist and arkosic sandstone. Runoff is medium to rapid, and internal drainage is rapid. This soil resembles Catoctin silt loam, rolling phase, which has developed from residual material derived from greenstone. It is associated with the Whiteford, Meadowville, and Worsham soils. Areas are in the Hazel-Whiteford-Worsham soil association.

Profile in a wooded area:

Surface soil—
1 to 0 inch, black, loose, fluffy forest duff; many small roots.
0 to 3 inches, brown, very friable silt loam; moderate, medium, granular structure; many schist fragments one-half inch or less in diameter.
3 to 11 inches, brown, friable silt loam; moderate, fine, subangular blocky structure that crushes easily to moderate, medium, granular structure; few small schist fragments and roots.

Parent material—
11 to 14 inches, mottled yellowish-red, olive-gray, and dark reddish-brown, highly weathered phyllitic schist fragments, intermixed with brown friable silt loam soil material.

Parent rock—
14 inches +, gray, hard, phyllitic schist that contains strata or stringers of chloritic greenstone schist and arkosic sandstone.

In places, the soil has a strong-brown or yellowish-red silty clay loam subsoil. Some small areas have a reddish loam surface soil and small loose fragments of arkosic sandstone. A few areas are undulating and have 2 to 7 percent slopes. Surface stones (shown on the map by symbol) impede cultivation in places. A few loose, thin fragments of flat phyllitic schist, 3 to 15 inches long, occur on the surface in spots.

This soil is medium to very strongly acid, low to medium in natural fertility, and low to moderate in organic matter. It has a low capacity to hold water that plants can use and retains added plant nutrients only fairly well. Permeability is moderately rapid in the surface soil and rapid in the parent material. The soil is droughty, and the risk of erosion is moderate to high.

Use and suitability.—This soil is used mostly for pasture, crops, and trees. Some areas are idle. Corn, red clover, lespedeza, small grain, and orchardgrass are the principal crops. Light applications of fertilizers are generally used. Yields are somewhat lower than on the associated deeper Whiteford and Myersville soils. Shallowness and rolling slopes make this soil poorly suited to row crops. The cultivated soil is only fairly easy to work and conserve and is suitable for only a few crops. The best use on many farms is permanent pasture. Good practices are contour tillage, stripcropping, use of long rotations that include sod crops, and the use of lime, complete fertilizer, manure, and crop residues.

Hazel silt loam, hilly phase (Hb) (Capability unit VIe–2).—This soil is similar to Hazel silt loam, rolling phase, but it has hilly relief, is slightly shallower to bedrock, and is more erodible. Runoff is rapid to very rapid, and internal drainage is rapid. Some areas have lost much surface soil, and a few shallow gullies have formed. Some stony, hilly acreage is included. Areas of this soil are in the Hazel-Whiteford-Worsham soil association.

Use and suitability.—Most of the acreage of this soil is in pasture, severely cutover forest, and idle areas. The pasture has a low carrying capacity and has received little fertilization. Because of shallowness and hilly relief, this soil is most suited to pasture or forest. Lime, complete fertilizer, manure, and some reseeding are needed to establish and maintain good bluegrass and whiteclover pasture.

Hazel silt loam, steep phase (Hc) (Capability unit VIe–2).—This soil, which is similar to Hazel silt loam, rolling phase, occurs on steep, deeply dissected upland slopes near major streams. Runoff is rapid to very rapid, and internal drainage is medium.

Use and suitability.—This steep soil is mostly in cutover hardwoods, chiefly oak, hickory, yellow-poplar, dogwood, red maple, blackgum, beech, and, in places, some Virginia pine. The few pastures have fairly poor herbage. Shallowness and steep slopes make this soil best suited to pasture. However, forest is the best use for the stony areas.

Hiwassee series

The Hiwassee series consists of deep, well-drained soils on high, well-developed stream terraces, mainly along Goose Creek and the Potomac River. They have developed from mixed alluvium that washed chiefly from the Piedmont Upland. They have a brown loam to fine sandy loam surface soil, a yellowish-red fine sandy clay loam upper subsoil, and a red fine sandy clay loam to clay loam lower subsoil. The underlying material is dominantly yellowish-red fine sandy loam to fine sandy clay loam, mottled with strong brown, light gray, yellow, and reddish brown and mixed with many cobbles and pebbles. The Hiwassee soils resemble the Eubanks soils.

Hiwassee loam, undulating light surface variant (Hf) (Capability unit IIIe–6).—This deep, well-drained soil on high stream terraces developed from old alluvium that washed from upland areas underlain chiefly by crystalline rocks and, in places, by some limestone, shale, and sandstone. Except for a few widely scattered areas, it occurs in the Triassic Lowland. It is not reached by floods, and runoff and internal drainage are medium. This soil is associated with the Masada and the high terrace phase of the Captina soils. Areas are in the Hiwassee-Masada soil association.

Profile in a cultivated area:

Surface soil—
0 to 9 inches, brown to yellowish-brown, very friable loam to fine sandy loam; weak, fine to medium, granular structure; many quartz pebbles and grass roots.

Subsoil—
9 to 18 inches, yellowish-red, friable fine sandy clay loam to light silty clay loam; weak to moderate, fine, subangular blocky structure that crushes easily to moderate, fine, granular structure; few fine pebbles and few grass roots.
18 to 30 inches, dark-red to red, firm clay to clay loam (slightly sticky and plastic when wet); strong, fine to medium, subangular blocky structure.
30 to 34 inches, dark-red to red, friable clay loam to fine sandy clay loam; moderate, fine, subangular blocky structure.

Underlying material—
34 to 54 inches, red, mingled with yellowish-red, sandy clay loam; weak, medium, subangular blocky structure; indefinite structure in places; material contains many rounded quartzite pebbles.

54 to 126 inches, beds of rounded gravel and cobbles, underlain by Triassic shaly sandstone and shale.
126 inches +, red Triassic shaly sandstone and shale.

Cobbles occur locally on the surface and in the profile. About 10 acres are on rolling slopes of 7 to 14 percent.

This soil is medium acid to very strongly acid, low in organic matter, and medium in fertility. Permeability is rapid in the surface soil and moderate in the subsoil. The capacity to hold water that plants can use is high to very high. The hazard of erosion is slight to moderate. This soil is fairly easy to work and conserve, except for the rolling areas.

Included with this soil as mapped are some areas of Hiwassee silt loam, undulating phase, that have a brown to dark-brown silt loam surface soil and a dark-red clay subsoil; and 60 acres of red, friable Etowah loam, undulating and rolling phases. These included soils are not mapped separately in the county.

Use and suitability.—Most of this soil is in crops, chiefly corn, small grain, mixed hay, and alfalfa. Rotations lasting 4 to 6 years are used. Lime is needed for rotations that include legumes. Lime and phosphate are generally needed, but complete fertilizer is necessary if nitrogen is not supplied through manure or legumes. Nitrogen is needed mostly for corn and grass, and potash is needed for such legumes as alfalfa and clovers. Contour cultivation, deep plowing, and compact seedbeds will help to conserve moisture and control erosion.

Hiwassee cobbly loam, undulating light surface variant (Hd) (Capability unit IIIe–7).—This soil has cobbles that occupy 10 to 25 percent of the surface and make up part of the soil profile. These cobbles hamper cultivation and reduce yields. They have a maximum width of about 6 inches and, except in small local areas, are uniformly distributed (fig. 9). Runoff and internal drainage are medium. About 137 acres that have a brown cobbly silt loam surface soil and a red cobbly clay subsoil and 38 acres of Etowah cobbly loam (not mapped in the county) are included with this soil as mapped.

Use and suitability.—This soil is in crops, pasture, and trees. Some areas are idle. This cobbly soil is not so suitable for crops as the noncobbly phase. It is hard to work but responds to good management and produces fair crops.

Hiwassee cobbly loam, rolling light surface variant (He) (Capability unit IIIe–7).—This soil has stronger slopes, a slightly shallower profile, and a thinner substratum of cobbly material than Hiwassee cobbly loam, undulating light surface variant. It occurs near drainageways on slopes leading from the smoother terrace crests and on narrow ridgetops. Runoff is rapid, and internal drainage is medium. Included are 29 acres with hilly relief (14 to 25 percent slopes) and 333 acres with a brown cobbly silt loam surface soil and a red cobbly clay subsoil.

Use and suitability.—Most of this soil is in rather poor pasture or trees, and the rest is in crops. Little fertilizer has been used on the pasture. The forest is mainly cutover hardwoods, such as white oak, red oak, yellow-poplar, blackgum, and red maple, but there are some pure stands of Virginia pine.

This soil is best suited to permanent pasture. However, except for the more cobbly and steeper areas, it can be used for crops. If row crops are grown, management is needed that includes the use of long rotations, many sod crops, and contour tillage. High fertility must be maintained. Good pasture can be produced by using complete fertilizer, lime, and manure.

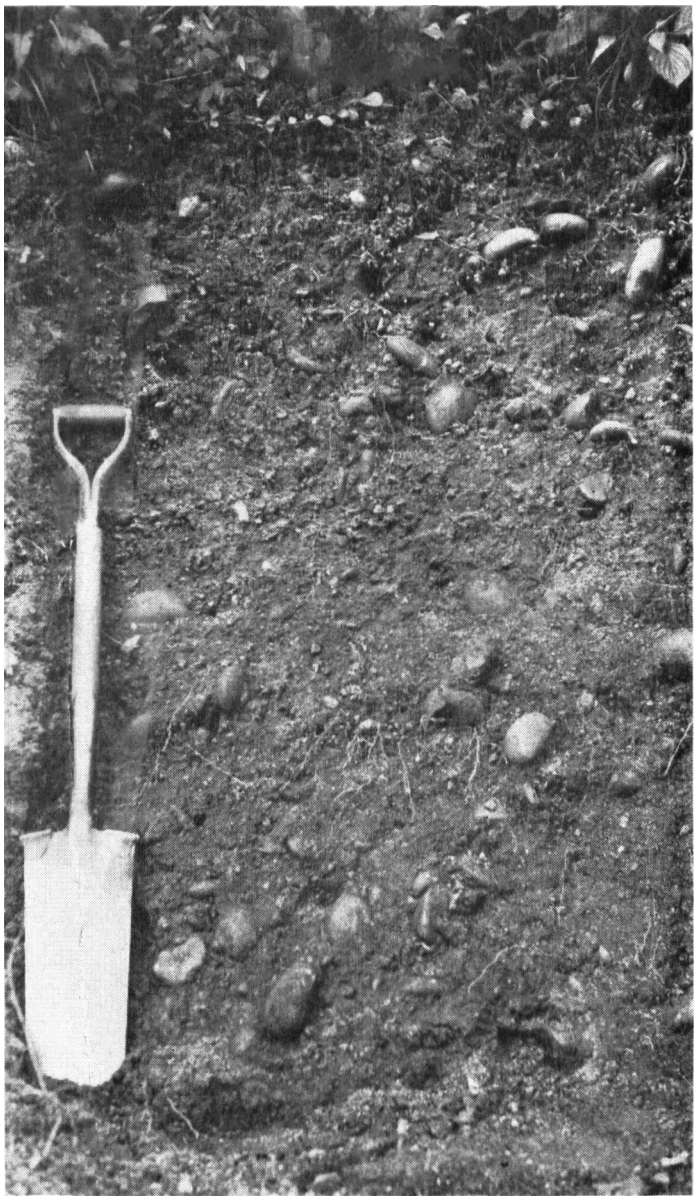


Figure 9.—Profile of Hiwassee cobbly loam, undulating light surface variant.

Huntington series

The Huntington series consists of well-drained, deep soils on rather high first bottoms along the Potomac River. The soils are brown to dark-brown silt loam throughout the surface and subsurface layers. Underlying are strata of silt, sand, and clay alluvium from areas underlain mostly by limestone. Huntington soils resemble the Congaree and Bermudian soils but are slightly brown in color and generally much less acid. The reaction is neutral to slightly acid in most places. Only one soil of the series is mapped in the county.

Huntington silt loam (Hg) (Capability unit I–1).—This brown, deep, well-drained soil on first bottoms along

the Potomac River has developed from recent alluvium washed from uplands underlain principally by limestone. Runoff is slow, and internal drainage is medium. Although most of this soil occurs as narrow strips on the highest elevation in the first bottoms, it is subject to flooding. It is associated with Lindside and Melvin soils on first bottoms and with Sequatchie, Elk, and Captina on low stream terraces. Areas are in the Huntington-Lindside-Melvin soil association.

Profile in a wooded area:

Surface soil—
0 to 16 inches, very dark grayish-brown to dark-brown, very friable silt loam; moderate, fine to medium, granular structure; trampling by animals when the soil is wet produces moderate, medium, subangular blocky structure; many wormholes and grass roots.

Subsurface—
16 to 50 inches, very dark grayish-brown, friable, heavy silt loam that is dark brown when crushed; moderate to strong, fine to medium, subangular blocky structure that has a grayish cast on cleavage planes of peds; many wormholes.

Underlying material—
50 to 60 inches, very dark grayish-brown, friable, light silty clay loam that is dark brown when crushed; moderate, very fine to fine, subangular blocky structure; wormholes fairly numerous.
60 inches +, very dark grayish-brown alluvium mottled with yellowish brown.

In places this soil is lighter brown throughout. Strata of very fine sandy loam occur in the subsurface layer. Some areas have a silty clay loam surface soil with moderate, fine, subangular blocky structure; in others there is a compact loamy layer at depths of 20 to 30 inches. In a few small areas next to old, deep drainageways in the first bottoms, the soil resembles Sequatchie loam. The depth of Huntington silt loam to beds of gravel and sand ranges from 8 to 25 feet but averages about 12 feet.

This soil ranges from medium acid to moderately alkaline but is slightly acid to neutral in most places. It is high in organic matter and fertility. Permeability is rapid in the surface soil and moderate to rapid in the subsurface layers. The capacity to hold water that plants can use is moderate. There is no erosion hazard, but some fine soil is deposited by occasional floods. This soil is easy to conserve and has high fertility. However, because of the hazard of occasional overflow, it is less suitable for crops than some of the better upland soils.

Use and suitability.—All areas of this soil are in crops and permanent pasture except some very narrow strips near river banks, which have a growth of sycamore, willow, and other water-tolerant trees. Most cultivated land is used for corn that is generally grown year after year without much fertilizer or crop rotation. Some corn is rotated with hay crops. Small grain is sometimes grown in a few places. However, it produces large straw and low grain yield, because of the high fertility and moisture of this soil. Lodging is common, especially in fields of wheat. Mixed hay and forage crops, except alfalfa, produce high yields. Yields of short-season hybrid corn are rather high in areas not reached by floods.

Huntington silt loam is the most fertile and productive soil in the county for crops to which it is suited, mainly corn and mixed hay. Stream overflow reduces the yields in some seasons, however. The soil is too wet for alfalfa, but can be used for mixtures of other legumes and grasses. Small quantities of lime might be needed for some areas.

Since the soil is suitable for almost continuous corn production with light fertilization, good practices are mostly proper seedbed preparation, good tillage, and the selection of higher yielding hybrids. Good permanent pastures are produced by only simple management, such as grazing control, seeding of proper mixtures, and light fertilization.

Iredell-Mecklenburg complex

This complex consists of Iredell and Mecklenburg soils that are intermingled in an intricate pattern. The soils of the two series resemble each other in color and depth. They differ, however, in relief and drainage. In addition, the Iredell soils have a claypan subsoil and the Mecklenburg soils do not.

The moderately well drained Iredell soils (fig. 10) have a brown silt loam surface soil and a yellowish-brown,

Figure 10.—Profile of Iredell silt loam. Note the massive to coarse, blocky structure.

olive-brown, and brown, plastic clay subsoil. The parent material is generally a thin layer of weathered black, brown, yellow, olive, and white coarse sandy loam rock material. Hard, massive rock generally occurs below depths of 24 to 28 inches. Iredell soils are fairly high in natural fertility.

The Mecklenburg soils occur on slightly higher and more rolling relief than the Iredell soils. They have better internal drainage.

Iredell-Mecklenburg silt loams, undulating phases (Ia) (Capability unit IVe–1).—The soils of this complex have formed from weathered diabase and syenite. They occur on dikes, sills, and stocks in the Triassic Lowland. They range in depth from 2 to 6 feet but average about 4 feet. Runoff is medium to rapid. Internal drainage is slow to very slow in the Iredell soil and slow in the Mecklenburg soil.

The most extensive soil of this complex is Iredell silt loam, undulating phase. This moderately well drained soil is underlain by diabase. It has a claypan in the subsoil and is the least desirable soil for agriculture in the complex. This complex of soils is associated with the Montalto, Legore, and Elbert soils.

Profile of Iredell silt loam, undulating phase, in a cultivated area:

Surface soil—
0 to 8 inches, yellowish-brown, friable silt loam; moderate, medium, granular structure.
Subsoil—
8 to 10 inches, yellowish-brown, friable silty clay loam (slightly plastic when wet); weak, fine, subangular blocky structure:
10 to 13 inches, yellowish-brown, firm, heavy silty clay loam faintly mottled with yellowish red, light brownish gray, and yellowish brown; plastic when wet; fine, subangular blocky structure.
13 to 24 inches, yellowish-brown to brown, very firm claypan; very plastic when wet; structureless (massive); round black concretions make black streaks on a cut surface.
24 to 28 inches, dark yellowish-brown, very firm claypan; very plastic when wet; structureless (massive); many small, black concretions.
Parent material—
28 to 34 inches, black, light olive-brown, light-olive, strong-brown, white, and gray, very friable coarse sandy loam composed of diabase rock materials.

The Iredell soil of this complex varies chiefly in the thickness of profile layers and in the depth to bedrock. The upper subsoil ranges from 4 inches to 10 inches in thickness. In most places it is faintly mottled with shades of brown, yellow, and gray immediately above the claypan. The thickness of the claypan ranges from 10 to 30 inches, but it is generally about 18 inches. Depth to bedrock is less than 4 feet in most places. The layer of parent material is fairly thin. In a few places, the soil is somewhat poorly drained, the color is lighter, and the relief is level to nearly level. The Iredell soil of this complex is browner throughout, slightly better drained, and more productive than most of the Iredell soils mapped in Fauquier and Culpeper Counties.

A small acreage of Orange silt loam, undulating phase (not mapped in the county), is included in this complex. This included soil overlies fine-grained, basic granodiorite in the Piedmont Upland area near Lovettsville and somewhat resembles the Iredell soil of this complex.

Profile of Mecklenburg silt loam, undulating phase, in a cultivated area:

Surface soil—
0 to 7 inches, brown to dark-brown, very friable silt loam; moderate, medium, granular structure.
Subsoil—
7 to 14 inches, brown, strong-brown, yellowish-red, and red, friable clay loam; slightly plastic when wet; moderate, medium, subangular blocky structure; many black mineral specks.
14 to 21 inches, brown to yellowish-red, firm clay; sticky and plastic when wet; many black mineral specks and splotches that are more numerous with depth; moderate, coarse to very coarse, blocky structure that can be crushed to moderate, fine, blocky structure.
Parent material—
21 to 31 inches, coarse sandy loam mottled with brownish yellow, dark yellowish brown, black, and white; consists of medium coarse-grained material weathered from diabase or syenite.

The subsoil in the Mecklenburg soil in this complex ranges from brown to yellowish red in color and does not have a claypan. In places a very firm 2- to 6-inch layer (very plastic when wet) occurs in the subsoil. The underlying rock is probably syenite. Depth to bedrock and the thickness of the profile layers are less than in the Iredell soil. Inclusions are small, red and reddish-brown areas that resemble Montalto soil and a shallow brown soil that is similar to the Legore soil.

Iredell-Mecklenburg silt loams, undulating phases, are strongly acid to neutral in reaction and medium to high in fertility. Permeability is moderate in the surface soil and moderately slow in the subsoil. The capacity to hold water that plants can use is low to moderate. The hazard of erosion is moderate. The soils are generally difficult to work but fairly easy to conserve. They are only moderately productive of many local crops.

Use and suitability.—Crop rotations 4 to 6 years in length are generally used on this complex. A common rotation is corn followed by small grain and mixed hay. Some orchardgrass is grown for seed, for forage, and, in longer rotations, for pasture. Because of the heavy claypan, slow to very slow internal drainage, and poor tilth of the Iredell soil, this complex is only fairly well suited to the local crops. It is better suited to some small grains and grasses than to corn and other row crops. Alfalfa is not grown successfully, but clovers yield fairly well, although good stands are rather hard to establish and maintain in some seasons. Lespedeza yields well. Excellent bluegrass and whiteclover pasture is grown. On farms where the major acreage is Mecklenburg soil, this complex produces more and higher yielding row crops and tilth is better.

This complex is comparatively fertile. The soils need more lime than the sandier soils, because of their fine texture. Lime and a fertilizer high in phosphate and potash are needed. Nitrogen is needed for crops such as corn if manure and crop residues are not available. The response of these soils to manure and crop residues is fairly good but is less than that of coarser textured, less fertile soils.

Iredell-Mecklenburg silt loams, eroded undulating phases (Ib) (Capability unit IVe–1).—The soils of this complex have lost nearly all of the surface soil through erosion. In some areas the plow layer consists of firm clay loam or clay, which is plastic to very plastic when

wet. Tillage conditions are very poor. Runoff is medium to rapid, and internal drainage is medium to slow. The risk of erosion is moderate to high, and the capacity to hold water that plants can use is low. This complex is suitable for only a limited variety of crops. It is associated with Iredell-Mecklenburg silt loams, undulating phases.

Use and suitability.—Most of the acreage of these soils occurs in small areas with the other phases of the Iredell-Mecklenburg complex. It is mostly in crops and permanent pasture. Management practices used on this complex are similar to those used on Iredell-Mecklenburg silt loams, undulating phases. Because of erosion and poor tilth, these soils are only fairly well suited to poorly suited to most crops. Hay crops are well suited, although permanent pasture is more suitable in many places. More lime, manure, crop residues, and erosion control are needed.

Iredell-Mecklenburg silt loams, rolling phases (Ic) (Capability unit IVe–1).—This complex has stronger slopes than Iredell-Mecklenburg silt loams, undulating phases. It has slightly thinner profile layers and a greater proportion of Mecklenburg silt loam, rolling phase. It occupies rolling upland ridges and slopes leading from the smoother ridgetops in the Triassic Lowland. Runoff is rapid, and internal drainage is slow to very slow.

Use and suitability.—About 60 percent of the acreage is equally divided between crops and permanent pasture. The rest is idle or in woods. Management practices are similar to those used for crops and pasture on Iredell-Mecklenburg silt loams, undulating phases, but the risk of erosion is greater. Conservation practices should include longer rotations that have more sod crops, contour cultivation, and stripcropping in places.

Iredell-Mecklenburg silt loams, eroded rolling phases (Id) (Capability unit IVe–1).—The soils of this complex have lost most of the surface soil through erosion, and some shallow gullies have formed in a few areas. In most places, the plow layer is mainly subsoil material. Runoff is rapid, and internal drainage is very slow to slow. These soils are difficult to work and conserve and are suitable for only a limited variety of crops.

Use and suitability.—This complex is used principally for permanent pasture and crops. It needs more careful management, particularly for control of erosion, than Iredell-Mecklenburg silt loams, rolling phases.

Iredell-Mecklenburg stony silt loams, undulating and rolling phases (Ie) (Capability unit VIIs–2).—The soils of this complex are similar to the nonstony uneroded phases of the Iredell-Mecklenburg complex but have loose stones up to boulder size on 10 to 25 percent of the surface. These stones make cultivation difficult or impossible. Some rock outcrops and wet spots of Elbert soil occur in many places. Shallow gullies have formed in places. Most of the areas are undulating and have slopes of 2 to 7 percent. The rolling areas have slopes of 7 to 14 percent. In a very small acreage, the slopes are 0 to 2 percent. Runoff is medium to rapid, and internal drainage is slow to very slow.

Use and suitability.—Most of the acreage of this stony complex is used for permanent pasture. Cutover forest and idle areas make up a small part. Pasture consists principally of bluegrass and whiteclover. Simple management practices consist of light fertilization (mainly with phosphatic fertilizer), liming, and close grazing. Lime and fertilizer containing chiefly phosphate and potash are needed for good pasture. If only grass is grown, nitrogen will probably be needed. Clipping of weeds and controlled grazing are good practices.

Kelly series

The Kelly series consists of moderately well drained to somewhat poorly drained soils on gently undulating relief. The surface soil is a grayish-brown to light yellowish-brown silt loam. The upper subsoil is a yellowish-brown to pale-yellow silty clay loam to silty clay. The lower subsoil is a light olive-brown to dark yellowish-brown, very plastic, massive claypan. The parent material is mixed and stratified weathered diabase and baked shale. The Kelly soils resemble the Brecknock and Iredell soils in many characteristics. They are distinguished from Brecknock soils by their claypan and lighter color, and from the Iredell soils by a greater depth to the claypan and a lighter color throughout the profile.

Kelly silt loam, undulating phase (Kb) (Capability unit IVe–1).—This light-colored, somewhat poorly drained soil has a claypan in the subsoil. It was derived from residual products of mixed baked shaly sandstone and diabase and occupies upland positions in the Triassic Lowland. It occurs along dikes, sills, and stocks of diabase and syenite rocks in rather large areas. This soil resembles Iredell silt loam, undulating phase, in having a claypan in the subsoil. It differs by having lighter color, greater depth to the claypan, and different parent material. Runoff is medium to slow, and internal drainage is very slow to slow. This soil is associated with the Iredell, Brecknock, Catlett, and Elbert soils.

Profile in a cultivated area:

Surface soil—
0 to 8 inches, brownish-yellow to dark yellowish-brown, very friable silt loam (pale brown when dry); weak, fine, granular structure.

Subsoil—
8 to 18 inches, yellowish-brown, friable light silty clay loam faintly mottled with gray and strong brown; moderate, medium, subangular blocky structure; some small, round concretions in lower 2 inches of the layer.
18 to 32 inches, yellowish-brown, olive-brown, and brownish-yellow, very firm claypan (very plastic when wet); strong, coarse, blocky structure to structureless (massive).

Parent material—
32 to 50 inches, very dark-gray, friable to firm clay loam or heavy silty clay loam; slightly plastic when wet; some gray, baked, shaly sandstone fragments.

Parent rock—
50 inches +, gray, baked, shaly sandstone.

In some places a faint gray mottling occurs in the first layer of the subsoil and in the top part of the claypan. In most places the lower part of the claypan is distinctly mottled with shades of gray. The thickness of the soil layers and their sequence vary considerably from place to place. In places there are three distinctly different claypans. In some areas a strong platy structure has developed in the subsoil immediately above the claypan. In others a weak, fine, platy structure is noticeable in the lower part of the surface soil. The depth to bedrock ranges from 2 to 7½ feet but averages about 4½ feet. The depth to the claypan ranges from 10 to 24 inches. Most of the underlying shaly sandstone has been baked

gray by geologic processes. In some places, however, the underlying rock is unbaked, red, Triassic shaly sandstone.

Inclusions are very small areas of Brecknock gravelly silt loam, undulating phase; Calverton silt loam, undulating phase; and Elbert silt loam, undulating phase. Small areas of Zion silt loam (not mapped in the county) that are similar to Iredell silt loam are also included.

The surface soil is medium to strongly acid. Reaction in the subsoil varies from place to place. It is neutral in places and medium acid in others. Most areas range from slightly acid to mildly alkaline. This soil is low in organic matter and medium to low in fertility. Because of the claypan, this soil is slowly permeable and has a moderate capacity to hold water available to plants. Water remains in the soil for long periods after wet seasons and makes cultivation difficult. This soil retains added plant nutrients well and is fairly easy to conserve.

Use and suitability.—Most of the acreage of this soil is in crops, is in pasture, and is idle. A small part is in trees. Management practices are similar to those used on the associated Brecknock and Iredell soils.

Because of the claypan and impaired internal drainage, the most suitable crops for this soil are permanent pasture and hay crops (except alfalfa). Ladino clover and fescue are perhaps best suited, but orchardgrass, timothy, lespedeza, red clover and similar plants can be grown successfully in some seasons. Corn and small grain produce well under good management, but seeding and cultivation are difficult. Management practices should include the use of lime, complete fertilizer, and manure, the return of crop residues, and proper timing for cultivation.

Kelly silt loam, level phase (Ka) (Capability unit IVw–1).—This soil is similar to Kelly silt loam, undulating phase, except in slope gradient. Most slopes average about 2 percent. Generally, the soil is slightly more poorly drained than the undulating phase, and mottles of gray are nearer the surface in most areas. Runoff is slow, and internal drainage is very slow to slow. A few wet spots of Elbert and Croton soils are included and are shown on the map by symbol.

Use and suitability.—Most of the acreage of this soil is in crops, pasture, or forest or is idle. Although management practices are similar to those for Kelly silt loam, undulating phase, some crop yields are slightly less because the soil is wetter.

This soil is suitable for only a limited variety of crops. Permanent pasture is its best use in most places. It is difficult to work, and its productivity is fair to poor. Lime, complete fertilizer, organic matter, and some surface drainage are needed. Fescue, ladino clover, bluegrass, and white clover grow well and are fairly tolerant of the moist conditions.

Legore series

The Legore series consists of brown, somewhat excessively drained soils that are shallow and are mostly on hilly and steep relief in association with Montalto, Iredell, and Mecklenberg soils. These soils have a brown to reddish-brown silt loam surface soil. In places the subsoil is absent. In others it is a weakly developed, brownish or yellowish-red to red, silt loam to silty clay. In some areas the surface soil directly overlies the parent material. The Legore soils resemble the Catoctin and Brandywine soils. They are similar to the Catoctin soils in texture. The Brandywine soils, however, have a coarser texture and in most places are deeper than the Legore.

Legore silt loam, undulating shallow phase (La) (Capability unit IVe–2).—This shallow, somewhat excessively drained, very friable soil has developed from weathered diabase and syenite. It occurs on upland ridgetops in the Triassic Lowland. Runoff is medium, and internal drainage is medium to rapid. This soil is associated with the Montalto, Iredell, Mecklenburg, Meadowville, and Elbert soils. Areas are in the Legore-Montalto soil association.

Profile in a cultivated area:

Surface soil—
0 to 7 inches, dark reddish-brown to yellowish-brown, very friable silt loam; moderate to strong, medium, granular structure.

Subsoil—
7 to 12 inches, mingled red, dark-red, yellowish-red, strong-brown, olive-yellow, and black, very friable to friable silt loam to silty clay loam, mixed with partly weathered rock fragments of similar colors.

Parent material—
12 to 20 inches, mingled red, yellowish-red, olive-yellow, strong-brown, and black, very friable silt loam to coarse sandy loam that developed from weathered diabase and syenite.

The thickness of the surface soil ranges from 4 to 14 inches. In places, the subsoil is thin and consists of red, friable silty clay or clay. The depth to bedrock varies greatly within short distances. Areas of this soil have a few loose cobbles and stones and an occasional rock outcrop.

This soil is medium acid. It has a moderate amount of organic matter and is medium in fertility. Permeability is rapid in the surface soil and moderately rapid to rapid in the subsoil. The capacity to hold water that plants can use is moderate. The risk of erosion is slight to moderate. The cultivated soil is fairly easy to work and conserve.

Use and suitability.—Most of the acreage of this soil is in crops and pasture. A small part is in trees, brush, and idle areas. The crops grown and the rotations and other management practices used are similar to those on the associated Montalto soils. Yields are slightly less, however, especially in dry seasons.

This soil is fairly well suited to many local crops. It is not well suited to alfalfa or other deep-rooted crops, because of its shallowness, but other hay crops and most kinds of small grain do well. Corn grows well if manure, crop residues, and heavy applications of phosphate and potash fertilizer are used. Nitrogen is needed for corn and grass crops if no manure or good crop residues are used. Light applications of lime are needed in most rotations to make the soil suitable for legumes. A major limitation to crop growth is lack of moisture storage capacity resulting from the shallowness of the soil. This soil needs some erosion control.

Legore silt loam, rolling shallow phase (Lb) (Capability unit IVe–2).—This soil occurs on the tops and sides of ridges. It has stronger slopes and less depth to bedrock than the undulating shallow phase, but it has developed from similar parent material. Runoff is rapid, and internal drainage is medium to rapid. This soil is more erodible than the undulating phase and has lost much surface soil in places. Locally, areas of cobbles and stones are more numerous. The soil is associated with

Legore silt loam, undulating shallow phase, and with Montalto soils. Areas are in the Legore-Montalto soil association.

Use and suitability.—Most of the acreage of this soil is in crops and pasture. A small part is in forest or is idle. Management practices for crops and pasture are similar to those for Legore silt loam, undulating shallow phase, but more erosion control is needed. Practices include use of more sod crops in the rotation, longer rotations, contour cultivation, heavier fertilization, application of more organic matter and lime, and stripcropping where feasible. This rolling soil responds readily to good management, especially if manure is used. Water conservation is needed because of the fairly strong slopes, rapid runoff, and shallow profile.

Legore silt loam, hilly shallow phase (Lc) (Capability unit VIe–2).—This excessively drained soil has steeper slopes and shallower depth to bedrock than Legore silt loam, undulating shallow phase. It occupies strong ridge sides and slopes in the Triassic Lowland. Runoff is rapid to very rapid, and internal drainage is medium to rapid. The hazard of erosion is high, and much surface soil has been lost through erosion. In places, there are enough stones, cobbles, gravel, and rock outcrops to interfere with cultivation. These places are shown on the soil map by symbol.

Use and suitability.—Most of this soil is in forest and permanent pasture, although some is in brush or lies idle. Because of shallowness and strong, hilly slopes, this soil is best suited to permanent pasture. Grazing control, some reseeding, liming, and liberal application, of phosphate and potash fertilizers are needed to produce good pasture. Complete fertilizer, lime, and manure may be needed in some areas to establish pasture quickly. The capacity to hold water that plants can use is very low to low on this soil. Plant growth is more limited by lack of moisture on this soil than on the undulating shallow phase.

Legore stony silt loam, undulating shallow phase (Ld) (Capability unit IVs–1).—Stones and cobbles are on the surface and in the profile of this soil. They occupy 5 to 20 percent of the surface and interfere with cultivation. Some rock outcrops occur. Runoff is medium, and internal drainage is medium to rapid. The capacity to hold water that plants can use is low. Tilth is fair to poor. Areas of this soil are in the Legore-Montalto soil association.

Use and suitability.—This inextensive soil is mostly in pasture. Much of the rest is in crops. Small acreages are in trees or brush or are idle. Management is similar to that of Legore silt loam, undulating shallow phase. Because of stoniness, this soil has less favorable moisture conditions and is suited to fewer crops than the undulating shallow phase. Good seedbeds are more difficult to prepare. Some areas are best for pasture.

Legore stony silt loam, rolling shallow phase (Le) (Capability unit VIs–3).—This soil has stronger slopes than Legore silt loam, undulating shallow phase. Runoff is rapid, and internal drainage is medium to rapid.

Use and suitability.—This soil is used in the same way as Legore silt loam, undulating shallow phase. However, because of fairly strong slopes, shallowness, and stoniness, it is more suitable for permanent pasture. Management needs are similar to those of Legore silt loam, rolling shallow phase.

Legore stony silt loam, hilly shallow phase (Lf) (Capability unit VIs-4).—This soil is similar to Legore silt loam, undulating shallow phase; its main differences are stoniness and strong slopes. Runoff is rapid to very rapid, and internal drainage is rapid. In a small acreage much surface soil has been lost through erosion and a few gullies have formed. The risk of further erosion is high. This soil has a low to very low capacity to hold water that plants can use and is very difficult to work.

Use and suitabilty.—Most of the acreage of this soil is in pasture, forest, and idle areas. Permanent pasture is the most suitable use because of the shallowness, stoniness, and strong slopes of the soil. More intensive management is required to conserve this soil and maintain good pasture than on Legore stony silt loam, rolling shallow phase.

Legore stony silt loam, steep shallow phase (Lg) (Capability unit VIIs–1).—This soil occupies very strong slopes in deeply dissected uplands near larger streams. It is shallower than the other Legore soils in many places, and the risk of erosion is high to very high. Runoff is rapid to very rapid, and internal drainage is rapid. The capacity to hold water that plants can use is very low. Tilth is poor, and yields are low. Deep gullies occur in a small acreage.

Use and suitability.—Most of the acreage of this soil is in trees. The rest is in pasture, brush, and idle areas. Permanent pasture can be maintained only by very intensive management, and grazing control is very important. The most suitable use for some areas is for forest.

Lindside series

The soils of the Lindside series have drainage characteristics and most physical characteristics that are intermediate between those of the Huntington and Melvin soils. The surface soil is a brown, thick silt loam. The subsurface is a mottled gray, strong-brown, yellowish-brown, and reddish-brown silt loam to silty clay loam. These soils resemble the Chewacla and Rowland soils. Only one soil of the series is mapped in the county.

Lindside silt loam (Lh) (Capability unit IIIw–2).—This soil has developed on first bottoms, mainly along the Potomac River. It consists of mixed alluvium washed chiefly from upland soils underlain by limestone. It is associated with the well-drained Huntington and the poorly drained Melvin soils; it is intermediate between them in drainage and associated characteristics. It resembles the Chewacla soil, which developed from alluvium washed from the Piedmont Upland, and is only fairly extensive among the bottom-land soils. Runoff and internal drainage are slow. Areas are in the Huntington-Lindside-Melvin soil association.

Profile in a cultivated area:

Surface soil—
0 to 10 inches, dark-brown, very friable silt loam; moderate, fine, granular structure.
Subsurface—
10 to 23 inches, faintly mottled dark grayish-brown and very dark gray, friable silty clay loam; weak, fine, subangular blocky structure that crushes easily to moderate, fine, granular structure; many black concretions.

23 to 39 inches, friable silty clay loam mottled with pinkish gray, light gray, and brown; moderate, medium to coarse, subangular blocky structure; many small pores and mineral concretions.

Underlying material—

39 to 60 inches, mottled gray and brown clay to silt loam, mixed with many rock fragments; stratified in places.

60 inches +, sandy or very gravelly alluvium.

The surface soil ranges from 8 to 18 inches in thickness and from silt loam to silty clay loam in texture. The subsurface layers range from 24 to 72 inches in thickness and from silty clay loam to clay in texture. A few wet spots are shown on the soil map by symbol. Lindside silt loam is better drained in areas where it grades to the higher lying Huntington silt loam. A few inclusions have a coarser textured surface soil and a rather compact layer in the subsoil.

This soil is mostly neutral to slightly acid and high in fertility and organic matter. It has a moderate capacity to hold water that plants can use. The water table rises to a high level, although permeability is moderately rapid in the surface soil and moderate to slow in the subsurface layers. On bottom lands where larger creeks from the Piedmont Upland join the Potomac River, this soil is mixed with crystalline rock materials and is more strongly acid in reaction than in other places.

Use and suitability.—Nearly all of Lindside silt loam has been cleared and is mostly in crops and pasture. Some acreage is in idle areas and in trees. Corn and mixed hay crops are grown under management that is similar to that of Huntington silt loam. Corn yields are generally high in favorable seasons but low in wet seasons.

The large amount of organic matter, good natural fertility, favorable reaction, and sufficient moisture in dry or wet seasons make this soil well suited to corn and hay crops (except alfalfa). The soil is excellent for permanent pasture. However, row crops are affected by slow internal drainage, an abruptly changing water table, and flooding. The quantities of nitrogen fertilizer needed are small compared with those needed on the less fertile, upland soils. Phosphate is the fertilizer needed most; some areas, however, may need potash. A greater variety of crops could be grown if the soil had protection from floods. Artificial drainage would increase crop yields.

Manassas series

The Manassas series consists of moderately well drained to well drained soils. These soils have developed from local alluvium and colluvium washed chiefly from the Bucks and Penn soils of the Triassic Lowland. In this county the Manassas soils resemble the Meadowville soils in color, drainage, and position but are shallower and less fertile. Only one soil of the series is mapped in the county.

Manassas silt loam (Ma) (Capability unit IIw–1).—This is a brown to reddish-brown, moderately well drained to well drained soil. It occupies gently undulating relief in depressions near the heads and upper courses of drainageways. Runoff is slow to medium, and internal drainage is medium. The development of this soil is similar to that of the Meadowville soils. Manassas silt loam, however, has a slightly redder and shallower profile and different parent material. It also resembles the Bucks soils but has a thicker surface soil and a less well developed subsoil. Areas of this soil occur in the Bucks-Penn-Calverton and Penn-Calverton-Croton soil associations.

Profile in a cultivated area:

Surface soil—

0 to 12 inches, reddish-brown to brown, very friable silt loam; weak, fine, granular structure; many grass roots; range in thickness, 10 to 30 inches.

Subsurface—

12 to 27 inches, dark reddish-brown, yellowish-brown, or red, friable heavy silt loam to silty clay loam; few, faint, pale-brown mottles; weak, medium, subangular blocky structure; few red shale pieces; range in thickness, 10 to 20 inches.

Underlying material—

27 to 36 inches, dominantly reddish-brown, friable silt loam faintly mottled with yellowish red and pinkish gray; many small pieces of weathered red shale and some quartz pebbles; range in thickness, 6 to 14 inches.

The surface soil is principally silt loam, although loam and fine sandy loam occur in places. In the wider fan-shaped areas and on longer slopes, the surface soil is 10 to 18 inches thick. It is underlain either by a developed subsoil (B horizon) or by a buried upland soil. In places around narrow drainage heads and along upper courses of drainageways, the alluvial and colluvial materials are thicker than elsewhere. No distinct subsoils have formed, however. Some areas adjacent to Penn shaly silt loam have many red angular shale particles on and in the soil. The depth to fairly hard rock ranges from 2½ to 8 feet but averages about 4½ feet. Small wet spots of Croton soil occur in places and are shown on the soil map by symbol.

Manassas silt loam is strongly to very strongly acid and has a moderate to large amount of organic matter. Fertility is medium to high. Permeability is moderately rapid in the surface soil and moderately slow to moderate in the subsurface. The capacity to hold water that plants can use is high. Seepage keeps the soil moist when the uplands are dry. This soil is easy to work and conserve and produces many of the crops suited to the area.

Use and suitability.—Most of the acreage of this soil is in crops and pasture. Small acreages are in trees or are idle. Corn, small grain, and mixed hay are grown in 4- to 6-year rotations. Yields of corn and hay crops are high compared with those on the associated Bucks and Penn soils.

Because of good moisture relations, medium to high fertility, and good tilth, Manassas silt loam is one of the most productive soils in the Triassic Lowland. It is especially well suited to corn, sorghum, soybeans, clover, grass, and mixed hay (except alfalfa). Alfalfa grows well for several years but then dies because of the moist soil. Small grain lodges badly in wetter seasons but ordinarily produces well. This soil is suited to intensive use. Production could be increased by proper fertilization and by the use of short rotations that include legumes. Lime, phosphate, and potash are needed most, but a small amount of nitrogen may be needed for some crops. If manure and crop residues are used, only small quantities of potash will be required on most areas. This soil responds to simple management.

Manor series

The Manor series consists of somewhat excessively drained to excessively drained soils that are mostly on hilly and steep relief. These soils are shallow and highly micaceous. The parent material is fine-grained quartz sericite schist. Manor soils are associated with Elioak and

Glenelg soils and are best suited to pasture or forest.

Manor silt loam, rolling phase (Mb) (Capability unit IVe–2).—This highly micaceous upland soil has developed on narrow ridgetops, on abrupt sides of ridges, and along the crests of the wider ridgetops. Generally, the surface soil overlies multicolored, soft, micaceous material derived from quartz sericite schist. Some areas, however, have a weak, very thin subsoil. Runoff is medium to rapid, and internal drainage is rapid. This soil is associated with other Manor soils and with Glenelg, Elioak, Meadowville, and Worsham soils.

Profile in a cultivated area:

Surface soil—
0 to 6 inches, yellowish-brown to brown, very friable, micaceous silt loam; weak, fine granular structure; few, small, angular quartz pieces and brownish-yellow, black, and olive schist fragments; many grass roots in the upper 2 inches.

Parent material—
6 to 19 inches, yellowish-brown, highly micaceous, very friable to loose, light loam soil material; schist and quartz fragments make up 40 to 70 percent of the soil mass; the schist fragments vary in color, are slightly weathered and soft, and, when crushed, are mostly fine mica flakes.
19 to 42 inches, dominantly olive-yellow, black, reddish-yellow, and strong-brown, soft, highly weathered schist; contains a small quantity of light loam soil material and some quartz fragments.
42 to 50 inches, weathered brown, olive, black, yellow, and reddish schist that can easily be dug with a shovel or pick; hard rock is deep in most places.

Depth to hard rock ranges from 5 to 90 feet but averages about 45 feet. The surface soil ranges from brownish yellow to dark reddish brown but is lighter in wooded areas. In many areas small, white quartz gravel and multicolored schist particles occur on the surface and are mixed with the surface soil. In some places the parent material contains yellowish-red and reddish soil and schist rock materials. In others it contains almost white, highly micaceous rock and soil materials. A few bedrock outcrops and loose stones occur. Nearly all of the soil has slight to moderate erosion. There are some deep gullies in places. A few small areas of shallow, brown and reddish-brown soils similar to the Catoctin soils are included with this soil.

Manor silt loam, rolling phase, is strongly to very strongly acid and low in organic matter and fertility. The total amount of potassium is high but may be rapidly depleted by continuous cropping. The soil does not retain added plant nutrients well and requires more fertilizer than Glenelg and Elioak soils. Permeability is rapid throughout the soil. The capacity to hold water that plants can use is low, and the risk of erosion is high. This soil is hard to work and conserve. Yields are fair to poor for most local crops.

Use and suitability.—Most of this soil is cleared and in crops and pasture. A small part is idle, and the rest is in forest. Management practices for this soil are very similar to those used on the associated Elioak and Glenelg soils. This soil is only fairly well suited to row crops because of its shallowness, rolling slopes, rapidly permeable profile, and low water-holding capacity. Much organic matter and complete fertilizer are needed to produce good yields.

This soil is fairly well suited to most hay and pasture crops except alfalfa. Alfalfa can be grown if high fertility is maintained, but it will not last as long as on the Glenelg and Elioak soils. Small grain, lespedeza, orchardgrass, fescue, ladino clover, timothy, and red clover are well suited. If the soil is used for row crops, it needs rotations that consist mostly of close-growing crops and sod crops, mechanical means for runoff control, and maintenance of high fertility.

Manor silt loam, hilly phase (Mc) (Capability unit VIe–2).—This soil is similar to Manor silt loam, rolling phase, in many characteristics but has stronger slopes and shallower depth to bedrock. The depth to hard rock ranges from 4 to 85 feet but averages about 40 feet. Runoff and internal drainage are rapid, the capacity to hold water that plants can use is low, and the risk of erosion is high. Many areas have lost much surface soil, and some shallow and deep gullies have formed. Variations are similar to those of the rolling phase.

Use and suitability.—This soil is mostly in forest and pasture. A small part is idle. Management practices are similar to those for Glenelg silt loam, hilly phase. The soil is suitable for only a limited variety of crops and is best used for permanent pasture. It responds readily to good management that includes mainly control of erosion and grazing and the use of fertilizer, lime, manure, and plant residues.

Manor silt loam, steep phase (Md) (Capability unit VIIe–3).—This soil differs from the hilly phase mainly in slope. The depth to hard rock ranges from 3½ to 80 feet but averages about 35 feet. Runoff is very rapid, and internal drainage is rapid.

Use and suitability.—This steep soil is mostly in forest. Small parts are in pasture or are idle. This soil is very erodible and suitable for only a limited variety of crops. It is best suited to permanent pasture or forest. Permanent pasture requires careful management. Forest should be protected from fire and grazing.

Masada series

The Masada series consists of moderately well drained to well drained, light-colored soils on high stream terraces. These soils have developed from old general alluvium. They are associated with the Hiwassee soils but are on more gentle relief. In addition, they have a slightly lighter colored surface soil and a yellowish-red instead of a red subsoil. In places, a thin compact layer in the lower subsoil retards internal drainage.

Masada loam, undulating phase (Mf) (Capability unit IIIe–6).—This soil occurs on high stream terraces, mainly along the Potomac River. It has developed from alluvial deposits of sand, silt, and clay washed mainly from light-colored, coarse-textured soils of the Piedmont Upland. The alluvium was mixed with sandstone and shale in places. Runoff is medium to rapid, and internal drainage is medium to slow. This soil is associated with Hiwassee soils and the high terrace phase of Captina soils. Areas are in the Hiwassee-Masada and the Captina-Robertsville-Elk soil associations.

Profile in a cultivated area:

Surface soil—
0 to 8 inches, yellowish-brown to very pale brown, very friable loam; weak, fine, granular structure.

Subsoil—
8 to 15 inches, brownish-yellow to yellowish-red, very friable loam to light fine sandy clay loam; weak, fine, subangular blocky structure.

15 to 28 inches, mingled red, yellowish-red, strong-brown, and yellow sandy clay loam to clay loam; friable, slightly sticky when wet; faint gray and white mottles in the lower part; weak to moderate, medium, subangular blocky structure.

28 to 36 inches, friable, heavy sandy clay loam; distinctly mottled red, yellowish red, yellow, light gray, white, and strong brown; slightly sticky when wet; weak to moderate, medium, subangular blocky structure; very weak, medium, platy structure in some places.

Underlying material—

36 to 42 inches, light sandy clay loam to sandy loam soil material distinctly mottled with red, yellowish red, reddish yellow, and gray; many cobbles and pebbles.

The texture of the surface soil ranges from loam to sandy loam, and that of the subsoil, from light fine sandy clay loam to heavy clay loam. The lower subsoil contains a thin, compact, platy layer in areas where this soil is transitional to Captina silt loam, high terrace phase. A few pebbles and cobbles are scattered over the surface in places. Most of this soil is on undulating slopes of 2 to 7 percent; however, about 10 acres on rolling slopes of 7 to 14 percent are included. In strongly rolling areas, profile layers are thinner, and the depth to beds of gravel and cobbles is less.

In most places this soil is strongly acid, but it ranges from medium acid to very strongly acid. It is low to medium in fertility and low in organic matter. Permeability is moderately rapid in the surface soil and moderately slow to moderate in the subsoil. The capacity to hold water that plants can use is moderate to high. The hazard of erosion is slight in the undulating areas and moderately high in the rolling areas. This soil responds well to additions of organic matter and is fairly easy to work and conserve.

Use and suitability.—Nearly all of this soil is in crops and pasture. Management needs are similar to those of the associated Hiwassee soils, but yields of most crops are slightly less. The soil is well suited to many of the local crops. Small grain, vegetables, and mixed hay are best suited. Alfalfa can be grown but is not too well suited, as drainage in the lower part of the soil is unfavorable. In comparison to Hiwassee soils, this soil needs slightly heavier applications of complete fertilizer, more frequent liming, more organic matter, and more legumes in longer rotations. Erosion control that includes contour tillage is needed on the stronger slopes.

Masada cobbly loam, undulating phase (Me) (Capability unit IIIe–7).—Cobbles on the surface and in the profile interfere considerably with cultivation. Most of this soil has slopes of 2 to 7 percent. Runoff is medium to rapid, and internal drainage is medium to slow. In some areas, the soil has a coarser texture than normal and is shallower to beds of gravel and cobbles. Mapped with this soil are about 30 acres that are rolling (7 to 14 percent slopes) and about 60 acres that are hilly (14 to 25 percent slopes). In the hilly areas most of the surface soil has eroded and a few gullies have formed.

Use and suitability.—Masada cobbly loam, undulating phase, is principally in crops, pasture, and forest, but a considerable part is idle. It is generally poorly managed for crops and pasture, and yields are low. Because of the cobbles, this soil is suitable for only a limited variety of crops and much of it is very poorly suited to cultivation. Permanent pasture is best for the rolling and hilly parts. Intensive use of the same management practices as those used on Masada loam, undulating phase, should give good results.

Meadowville series

The Meadowville series consists of soils along the upper parts of drainageways, in depressions, and at the base of slopes. They have developed from fine materials washed from the associated Chester, Eubanks, Fauquier, Myersville, Catoctin, Glenelg, Montalto, Legore, and Manor soils. They have a thick, brown loam to silt loam surface soil and a yellowish-brown fine sandy clay loam to reddish-brown silt loam and silty clay loam subsoil. In places there is very little subsoil and the soil resembles that of the first bottoms. The underlying material is generally mottled brown, strong brown, red, yellow, and gray and contains small, weathered fragments of granodiorite, greenstone, and mica schist. Most areas of Meadowville soils are free of stones and pebbles and are highly fertile and productive.

Meadowville silt loam (Mh) (Capability unit IIw–1).—This deep, brown, moderately well to well drained soil has formed in local colluvial and alluvial deposits at the foot of slopes, in depressions at the heads of drainageways, and along the upper courses of drainageways. The deposits have been washed from associated Myersville, Fauquier, Catoctin, Glenelg, Elioak, and Manor soils. Most areas are rather small and widely scattered. Runoff is slow to medium, and internal drainage is medium.

Profile in a cultivated area:

Surface soil—

0 to 20 inches, brown to dark-brown, very friable silt loam; moderate, medium, granular structure.

Subsurface—

20 to 40 inches, yellowish-brown to yellowish-red, friable, heavy silt loam to silty clay loam; weak, fine to medium, subangular blocky structure that crushes easily to weak, fine, granular structure.

Underlying material—

40 to 48 inches, yellowish-brown to reddish-brown, friable silt loam or light silty clay loam; many black specks of material washed from soils underlain by greenstone.

This soil varies considerably in the thickness of the surface soil, in the development of the subsurface horizon, and in the source of parent materials. It has a thicker surface soil and less subsurface development in places where the materials washed from the higher Fauquier, Catoctin, and Myersville soils. Where this soil is associated with Montalto soils, it is shallower than elsewhere and redder throughout. Where it is associated with the Glenelg, Elioak, and Manor soils, it has a thin surface soil and a fairly well developed subsurface layer, and it contains soft, highly micaceous material. Meadowville silt loam is deeper than normal near the heads of drainageways and at the base of steep slopes. The thickness of the surface soil ranges from 12 inches near the uplands to as much as 35 inches in the center of depressions and along drainageways. In most areas the soil has distinct development and differs in color and texture below 20 inches. Greenstone schist, schist fragments, and quartz gravel are common throughout the profile, especially where gully erosion has occurred on adjacent slopes and around drainage heads.

Meadowville silt loam is slightly to medium acid and high in organic matter and fertility. Permeability is rapid in the surface soil and moderately rapid in the sub-

surface layer. The capacity to hold water that plants can use is high to moderate. The soil receives seepage water from surrounding slopes and remains fairly moist when surrounding soils are dry. It is fairly easy to work and conserve and produces many local crops.

Included are small areas of a Starr soil (not mapped in the county) and of Rohrersville soils. The included Starr soil is a silt loam with a dark-brown to dark reddish-brown, friable silt loam surface soil and a reddish-brown, friable subsurface layer. It is slightly less acid than Meadowville silt loam. The included Rohrersville soils are in small, somewhat poorly to poorly drained areas, which are shown on the soil map by wet-spot symbol.

Use and suitability.—Most of this soil is in crops and pasture. The rest is in forest or is idle. Practices are similar to those used for the associated Myersville and Glenelg soils, but less manure is generally used for most crops. Corn and mixed hay produce good yields on some areas without fertilizer.

This soil is excellent for corn, sorghum, ladino clover, red clover, fescue, orchardgrass, lespedeza, and many vegetables. It is not well suited to alfalfa and many small grains. Alfalfa produces well for 1 or 2 years and then gradually dies. Small grain lodges badly in wet seasons. Light applications of lime will generally raise the pH to a desired level. Lime, phosphate, and potash are needed to improve fertility. If nitrogen is not furnished through manure, it must be added for corn and grass. Some ditching of wet spots may be needed in a few areas.

Meadowville silt loam, cobbly variant (Mk) (Capability unit IIw–1).—This soil has developed from recent colluvial materials washed from the slopes of the gravelly Braddock and Thurmont soils. Some materials also have washed from Athol gravelly silt loam and Dyke cobbly silty clay loam. Most areas are small and widely scattered. Quartz gravel, up to 6 inches in size, on the surface and in the profile interferes with cultivation. In many places this soil has a finer texture in the subsurface layer than Meadowville silt loam. Runoff is slow to medium, and internal drainage is medium to rapid.

Use and suitability.—This soil is mostly in crops and pasture. Some of the acreage is in forest and some is idle. Management is similar to that of the surrounding Braddock, Thurmont, and Athol soils. Yields are generally better than on the Braddock and Thurmont soils. This soil is less productive than Meadowville silt loam and is not suited to as wide a variety of crops. Similar management practices are needed.

Meadowville loam (Mg) (Capability unit IIw–1).—This moderately well drained to well drained, brown soil developed from materials washed from the associated Chester, Brandywine, and Eubanks soils. It occupies recent colluvial lands near the heads and upper reaches of drainageways and along foot slopes. It occurs in small, widely scattered areas throughout the Piedmont Upland area. Runoff is slow to medium, and internal drainage is medium to rapid. This soil differs from Meadowville silt loam in parent material. It is also coarser textured and has a slightly lighter color and stronger development in the subsurface layer. Areas are in the following soil associations: Eubanks-Chester, Chester-Brandywine (loams and silt loams), and Chester-Brandywine (loams and sandy loams).

Profile in a cultivated area:

Surface soil—
0 to 18 inches, yellowish-brown to dark-brown, very friable loam; moderate, medium, granular structure; many grass roots.

Subsurface—
18 to 35 inches, yellowish-brown, friable clay loam to sandy clay loam; weak, fine, subangular blocky structure; few pieces of quartz gravel.

Underlying material—
35 to 46 inches, friable to very friable, light sandy clay loam to sandy loam soil material with mottles of yellowish red, yellowish brown, red, pale yellow, and light brown; small pieces of quartz gravel are common.

The surface soil ranges from sandy loam to light silt loam in texture and from 10 to 25 inches in thickness. The subsurface and underlying materials range from sandy loam to clay, but they are mostly sandy clay loam and silty clay loam. In many places the textures are those of buried Chester soils. The depth to bedrock ranges from 8 to 25 feet but averages about 12 feet. Small, wet spots of Worsham silt loam and Belvoir loam are included in some places and are shown on the soil map by wet-spot symbol.

This soil is medium acid and high in organic matter and fertility. Permeability is rapid in the surface soil and moderate in the subsurface layer. The soil is easy to work and conserve and produces most local crops.

Use and suitability.—Most of Meadowville loam is in crops and pasture. The rest is in forest or is idle. Management is similar to that of Chester and other associated soils, but yields of most crops are slightly larger. Although this soil is similar in many ways to Meadowville silt loam, it is slightly more acid. It also has better tilth and is somewhat better for garden crops.

Melvin series

The Melvin series consists of poorly drained, light-colored soils developed from alluvium that was washed mainly from limestone. They are mottled with shades of gray, brown, and red throughout and have a silt loam surface soil and a silty clay loam subsoil. The Melvin soils resemble the Wehadkee and Bowmansville soils in most characteristics but were derived from different alluvium and are much less acid. They are associated with the Huntington and Lindside soils and have developed from similar alluvium. Only one soil of the series is mapped in the county.

Melvin silt loam (Mm) (Capability unit Vw–1).—This soil is poorly drained and prominently mottled with gray and brown. It occurs in narrow depressions, mainly on first bottoms of the Potomac River. It has developed from alluvial materials washed from areas underlain principally by limestone. Runoff is very slow, and internal drainage is slow. This soil floods more readily than any of the associated soils of the bottom lands. It resembles Wehadkee silt loam, which developed on bottom lands from alluvium washed principally from areas underlain by crystalline rocks. This soil is associated with Huntington silt loam and Lindside silt loam. Areas are in the Huntington-Lindside-Melvin soil association.

Profile in a pastured area:

Surface soil—
0 to 12 inches, light brownish-gray, friable silt loam mottled with grayish brown and yellowish brown; common, fine, faint mottles; strong to moderate, medium, granular structure; many grass roots.

Subsoil—
12 to 22 inches, light brownish-gray, firm, light silty clay loam mottled with grayish brown, yellowish brown, and black; many, distinct, medium mottles; moderate, coarse, subangular blocky structure that breaks easily to moderate, fine and very fine, subangular blocky structure; no grass roots.

Underlying material—
22 to 44 inches, light brownish-gray, firm, light silty clay loam mottled with yellowish brown, grayish brown, and black; many, coarse, prominent mottles; strong, medium to fine, subangular blocky structure.
44 inches +, stratified layers composed of very fine sandy loam, silt loam, and gravel.

Along small creeks where this soil is associated with Athol soils, it has thinner profile layers, shallower depth to bedrock, and some gravel. Floods have deposited thin layers of very fine sandy loam material in places. Where this soil occurs next to the Piedmont Upland and to high stream terraces, it contains materials washed from these areas and is less fertile and more acid.

Melvin silt loam is slightly acid to mildly alkaline and high in fertility. It is subject to flooding and has a low water intake and a high water table. Permeability is moderately rapid in the surface soil and slow to moderately slow in the subsoil. The soil is hard to work because of wetness but is easy to conserve. It is suitable for only a narrow range of crops, and yields are low.

Use and suitability.—Most of the acreage of this soil is in pasture or is idle. A small part is in forest. Permanent pasture consists mainly of bluegrass and whiteclover but has much bulrush, sedgenutgrass, stickweed, and other water-tolerant plants. Few areas have been drained or properly fertilized, but yields of pasture are fairly good. Wooded areas are mostly in sycamore, willow, and birch.

Because of poor drainage, this soil is unsuitable for row crops. Its best use is for permanent pasture. It has a high inherent fertility, a large moisture supply, and a fairly high lime content. The principal pasture requirements are light applications of phosphatic fertilizer, clipping of undesirable weeds and grasses, close grazing, and some ditching. Some nitrogen and potash may be needed on overgrazed or newly seeded pastures.

Mixed alluvial land

Mixed alluvial land (Mn) (Capability unit Vw–1).—This miscellaneous land type is mostly mixed alluvium washed from many different upland soils and deposited on first bottoms along some of the smaller streams. Most areas are somewhat poorly drained to poorly drained, but some are well drained or moderately well drained. This land type is subject to frequent flooding and receives new alluvial deposits each time the streams overflow. It is closely associated with other first-bottom soils, soils of the colluvial lands, and many upland soils.

This land type varies considerably. In some places it is a complex of soils similar to those of the Chewacla, Wehadkee, Bowmansville, and Rowland series. In others, it is chiefly a fine-textured layer of alluvium, 6 to 14 inches deep, over beds of sand, gravel, and cobbles. This alluvium is brown to mottled brown, yellow and gray. At the base of slopes and at the mouth of intermittent drainageways near first bottoms, Mixed alluvial land includes small areas of colluvial material similar to that of the Manassas, Croton, Meadowville, and Worsham soils. All areas of this land have poorer development than similar areas along the larger streams. They overlie sands, gravel, and cobbles. The depth ranges from 2 to 10 feet but averages about 5 feet. Runoff is slow, and internal drainage is slow to rapid.

Use and suitability.—Nearly all of Mixed alluvial land was once cleared and cultivated but is now mostly in pasture, forest, and idle areas. Only a small part is cultivated. The forest is mostly sycamore, birch, black willow, swamp white oak, white oak, and other water-tolerant trees and shrubs. The main crops are vegetables and hay, but a little corn is grown. The pasture consists of bluegrass, whiteclover, bulrush, stickweed, sedgenutgrass, and other plants. Little pasture has been limed, fertilized, or properly managed.

This land type is best suited to pasture or forest because of poor tilth, poor drainage, and flood hazard. Vegetables, row crops, or hay can be produced on a few higher areas that are better drained. Good pasture management is needed and should include liberal use of lime and fertilizer (especially phosphate), moderately close grazing, and the clipping of undesirable herbage. Artificial drainage by ditching or bedding is necessary on some areas to establish and maintain good pasture.

The areas of this land type that occupy the colluvial lands next to the bottom lands are not frequently flooded. They have a friable or very friable silt loam to gravelly loam and sandy loam surface soil that is brownish, yellowish, or grayish. The subsurface layer is yellow, brown, reddish, or mottled, friable to firm, and weakly developed. In many places gravel and cobbles occur on and in the soil. Small areas near creek banks are mostly coarse sand, gravel, and cobbles.

This land type is medium to very strongly acid and low to high in organic matter and fertility. The browner, deeper, better drained areas are highest in organic matter and fertility, and the shallower, lighter colored, more gravelly areas are lowest. The capacity to hold water that plants can use ranges from low to high. Permeability is moderate to very rapid in most places.

Montalto series

The Montalto series consists of red, well-drained, moderately deep, fertile soils. They are mostly on undulating and rolling relief. They have a brown silt loam surface soil, a red, friable silty clay loam to clay subsoil, and thin, weathered syenite and diabase parent material. Montalto soils are higher on the landscape than the Iredell and Mecklenburg soils. Much of the acreage is stony.

Montalto silt loam, undulating shallow phase (Mo) (Capability unit IIe–2).—This well-drained soil occurs on moderately high, narrow upland ridgetops in the Triassic Lowland. It has formed from the weathered products of medium-grained syenite or syenite-diabase dike rock. Runoff is medium, and internal drainage is medium to rapid. This soil resembles the Fauquier soils of the Piedmont Upland. It has a thinner, more friable, and finer structured subsoil than most of the local red soils.

Profile in a cultivated area:

Surface soil—
0 to 7 inches, reddish-brown to brown, very friable silt loam; moderate, medium, granular structure; a few small pieces of basic rock.
Subsoil—
7 to 14 inches, dark-red to red, friable silt loam; very weak, fine to medium, subangular blocky structure; crushes easily to very weak, coarse, granular structure; contains small, black concretions and small, speckled syenite fragments.
14 to 26 inches, red, friable light silty clay loam (slightly sticky when wet); very weak, fine, subangular blocky structure; many small syenitic diabase fragments, black concretions, and small mica flakes; fragments more numerous in lower 3 inches of the layer.
Parent material—
26 inches +, very friable, coarse sandy clay loam mottled with red, yellow, yellowish brown, and black; mixed with many pieces of hard basic rock; generally thin over bedrock.

In most places the subsoil is silty clay loam, but in some it is clay. It ranges from a few inches to 40 inches in thickness within very short distances. In most places, however, it is less than 18 inches thick. Rock outcrops and cobbles occur in places. Some areas of shallow phases of Legore silt loam are included.

Montalto silt loam, undulating shallow phase, is medium to strongly acid, moderate in organic matter, and medium in fertility. Permeability is rapid in the surface soil and moderate to moderately rapid in the subsoil. The capacity to hold water that plants can use is moderate. The risk of erosion is slight to moderate. The soil is easy to work and conserve and produces good yields.

Use and suitability.—Most of the acreage of this soil is cleared and cultivated. The rest is in pasture, forest, and idle areas. Rotations are generally 3 to 6 years in length. A common rotation is corn, then small grain, followed by hay crops like alfalfa, lespedeza, red clover, ladino clover, orchardgrass, and mixtures of these. Fertilizer and lime are used in most rotations, and yields are good.

This soil is well suited to a wide variety of crops because of its smooth slopes, good tilth, medium fertility, and moderate capacity to hold water that plants can use. The common local crops, including alfalfa and many vegetable crops, are grown successfully. The soil is comparatively low in total potassium. Lime, phosphate, and potash are the major needs. Some nitrogen will be needed for such crops as corn and grass if it is not supplied through manure or legumes. Simple management practices to control runoff and erosion are needed.

Montalto stony silt loam, undulating shallow phase (Mp) (Capability unit IVs–1).—This soil is somewhat shallower to bedrock than the associated Montalto silt loam, undulating shallow phase. It has formed from weathered products of medium-grained syenite. Stones and cobbles compose 5 to 20 percent of the soil mass and make cultivation difficult. Some rock outcrops occur locally. Runoff is medium, and internal drainage is medium to rapid.

Use and suitability.—Most of this soil has been cleared and is used for pasture and cultivated crops. A small part is in woodlots, and a few areas are idle. Management is similar to that of Montalto silt loam, undulating shallow phase, but most crop yields are much less. Mainly because of stoniness, this soil has a lower capacity to hold water that plants can use and a poorer tilth than Montalto silt loam, undulating shallow phase. It is not suited to as wide a variety of crops, but the fertility and management needs are similar. Preparation of seedbeds and harvesting of crops are much more difficult.

Montalto stony silt loam, rolling shallow phase (Mr) (Capability unit IVs–1).—This soil has stronger slopes, more stones, and shallower depth to bedrock than Montalto silt loam, undulating shallow phase. It is also more erodible and has lost much surface soil in places. Runoff is rapid, and internal drainage is medium to rapid. This soil includes a few nonstony areas and a small acreage in which some deep gullies have formed.

Use and suitability.—Most of this soil has been cleared and is in permanent pasture or cultivated crops. Management and requirements are similar to those of Montalto silt loam, undulating shallow phase, but more acreage is suited to pasture. Stripcropping and the use of more sod crops, longer rotations, and heavier fertilization are among the practices needed to maintain yields and control erosion.

Myersville series

The Myersville series consists of well-drained, moderately deep, fertile soils on undulating, rolling, and hilly relief. They have a brown silt loam surface soil and strong-brown to yellowish-red subsoil. They are underlain by residual material from greenstone schist. These soils resemble the Chester silt loam soils, but the depth to bedrock is less. Stony types are common. The Myersville soils are well suited to most crops of the area.

Myersville silt loam, undulating phase (Ms) (Capability unit IIe–2).—This brown, upland soil has formed from residual products of greenstone. It resembles Chester silt loam, undulating phase, but has different parent material, a slightly coarser textured subsoil, and greater depth over bedrock. Runoff and internal drainage are medium. The cover consists mostly of bluegrass, whiteclover, and broomsedge. Trees are desirable oaks, hickory, and poplar. Most of the large areas occur on the Catoctin and Hogback Mountains and on ridges through the central part of the county. This soil is associated with the Fauquier, Catoctin, Meadowville, and Rohrersville soils. Areas are in the Myersville-Catoctin-Fauquier soil association.

Profile in a cultivated area:

Surface soil—
0 to 7 inches, brown, very friable silt loam; moderate, medium, granular structure; many grass roots.
Subsoil—
7 to 11 inches, strong-brown, friable, light silty clay loam; moderate, fine to medium, subangular blocky structure; few small angular rock fragments.
11 to 18 inches, yellowish-red, friable to firm silty clay loam; strong, medium, subangular blocky structure; few black films and coatings and greenstone fragments.
18 to 21 inches, yellowish-red, strong-brown, yellowish-brown, and olive-yellow, friable, light silty clay loam to heavy silt loam; weak, medium, subangular blocky structure; many multicolored, partly weathered particles of greenstone schist.
Parent material—
21 to 50 inches, weathered olive, strong-brown, yellow, red, black, and greenish rock material from greenstone schist.
Parent rock—
50 inches +, greenstone.

The surface soil ranges from yellowish brown to dark brown in color and from 4 to 10 inches in thickness. The subsoil ranges from light silty clay loam to light clay in

texture and from 6 to 20 inches in thickness. It is yellowish red in most areas but ranges from yellowish brown through strong brown to reddish brown. The depth to bedrock ranges from 3 to 8 feet but averages about 5 feet.

In places small areas of Fauquier silt loam, undulating phase, are included. Also included are a few small areas of a soil resembling Aldino (not mapped in the county), which are on top of the Catoctin and Hogback Mountains. The soil in these areas is underlain by massive agglomerate greenstone and is shallower to bedrock and lighter in color throughout than Myersville silt loam, undulating phase.

This soil is medium to strongly acid and has a moderate amount of organic matter and medium fertility. Permeability is moderately rapid in the surface soil and moderate in the subsoil. The capacity to hold water that plants can use is high. The soil retains added plant nutrients well. It is easy to work and conserve and is highly productive. A wide variety of crops can be produced under simple management.

Use and suitability.—This soil is mostly in crops and pasture. A small acreage is in forest and idle areas. A common 4- to 6-year rotation is corn, small grain, and mixed hay. Alfalfa grows in many areas. Orchardgrass is grown both for seed and for hay in some longer rotations.

Myersville silt loam, undulating phase, is suited to most local crops. It is especially well suited to corn, small grain, alfalfa, and all hay and forage crops. Potatoes and most vegetables grow well, but the soil is not so well suited to them as the coarser textured soils. Several apple and peach orchards have produced well. Organic matter and nitrogen are not so greatly needed as on some of the less fertile soils. If nitrogen is supplied through manure and legumes, the soil still needs lime, phosphate, and potash for good yields.

Myersville silt loam, rolling phase (Mt) (Capability unit IIIe–2).—This extensive soil occupies strongly rolling ridgetops and long slopes leading from ridge crests. It has stronger slopes and thinner profile layers than Myersville silt loam, undulating phase. Runoff is medium to rapid, and internal drainage is medium. Much of the surface soil has been lost through erosion, and some deep gullies have formed. Cobbles and stones occur in spots. This soil is associated with the Fauquier and Catoctin soils.

Use and suitability.—This soil is mostly in crops and pasture. Small parts are in cutover forest or are idle. Practices and needs are similar to those for Myersville silt loam, undulating phase, but more control of erosion is needed because of the stronger slopes. Control methods should include contour cultivation, long rotations, more sod crops in the rotation, and some stripcropping. This soil is fairly easy to work and conserve and responds to good management. The range in crop suitability is medium to wide.

Myersville silt loam, hilly phase (Mu) (Capability unit VIe–1).—This soil is very similar to the undulating phase, but it occurs on stronger upland ridge slopes and has thinner profile layers. The subsoil is very thin in places. Runoff is rapid to very rapid, and internal drainage is medium. The capacity to hold water that plants can use is moderate. The hazard of erosion is high. Areas are in the Myersville-Catoctin-Fauquier soil association. Some small areas of Catoctin soil are included with this soil as mapped.

Use and suitability.—Most of Myersville silt loam, hilly phase, is in pasture. A considerable acreage is in forest and idle areas, and a small acreage is cultivated. This soil is best suited to permanent pasture because of its hilly relief. It has moderate fertility and good permeability and produces some of the best pasture in the county under good management. Light applications of lime, potash, and phosphate are needed for good pasture. Complete fertilizer is needed in some areas. Good results are obtained if manure and other organic materials are applied to new pasture and eroded areas.

Myersville silt loam, eroded hilly phase (Mv) (Capability unit VIe–1).—On this soil, a large part of the surface soil has eroded, and a few deep gullies have formed. Runoff is very rapid; internal drainage is medium. The risk of further erosion is high.

Use and suitability.—This soil is used mostly for permanent pasture. The rest is in crops, cutover forest, and idle areas. Hilly relief and severe erosion limit the use of this soil. Permanent pasture is the most suitable use. Lime, complete fertilizer, and manure and other organic materials are needed to establish good permanent pasture. Some seeding is also needed. When the pastures are established, they will require lime, potash, phosphate, and good grazing management. Some deeper gullies may have to be filled or their growth checked.

Myersville stony silt loam, undulating phase (Mw) (Capability unit IIIs–1).—This stony soil, which occurs on smooth, high upland ridgetops, has developed from weathered products of greenstone. Except for stoniness, it is very similar to Myersville silt loam, undulating phase. Loose stones and cobbles on the surface and in the profile make cultivation difficult. Bedrock outcrops occur in places. Runoff and internal drainage are medium. The soil has a moderate amount of organic matter and medium fertility. The risk of erosion is slight to moderate, and the soil is fairly easy to conserve.

Use and suitability.—Most of this soil is in crops and permanent pasture. A small percentage is in cutover forest and idle areas. Crop and pasture management is similar to that of Myersville silt loam, undulating phase, but most yields are lower. However, because of stoniness and poor tilth, this soil is less suitable for cultivated crops. Alfalfa, orchardgrass, and similar hay crops are best suited. Good stands of corn and small grain are difficult to establish on the more stony areas. Some areas cannot be cultivated unless the stones are removed.

Myersville stony silt loam, rolling phase (Mx) (Capability unit IIIs–1).—From 10 to 25 percent of the mass of this soil is composed of stones and cobbles. Boulders and bedrock outcrops occur locally. Runoff is medium to rapid, and internal drainage is medium. The hazard of erosion is moderate to high. Occasional deep gullies have formed in a small acreage. This soil is associated with other Myersville soils.

Use and suitability.—Most of this soil is in pasture and crops. A large acreage is in forest and idle areas. This soil is managed like Myersville silt loam, undulating phase, but most crop yields are slightly less. More intensive management is needed for row crops. The steeper, stonier, and more eroded areas are best for pasture.

Myersville stony silt loam, steep phase (My) (Capability unit VIs–2).—This soil occurs on strong, high upland ridge slopes. It is underlain by greenstone. It is steeper, stonier, and shallower to bedrock than Myersville silt loam, undulating phase. Rock outcrops and shallow gullies are characteristic. Runoff is rapid to very rapid, and internal drainage is medium. This soil is hard to work and conserve. It is associated with the Fauquier and Catoctin soils and with other Myersville soils.

Use and suitability.—This soil is used mostly for permanent pasture and forest. It is best suited to these uses because of the stoniness and steep relief. Pasture management is like that on Myersville silt loam, hilly phase. However, more intensive management is needed.

Myersville stony silt loam, eroded steep phase (Mz) (Capability unit VIs–2).—A large part of the surface soil has eroded, and some deep gullies have formed. Runoff is very rapid, and internal drainage is medium. The capacity to hold water that plants can use is moderate to low, and the risk of further erosion is high. This soil is hard to work and conserve and has limited use.

Use and suitability.—Practically all of this soil was once cleared and cultivated. Most of it has reverted to forest. The rest is in permanent pasture or is idle. This soil is more poorly suited both to forest and pasture than Myersville silt loam, eroded hilly phase. It needs more intensive pasture management.

Penn series

The Penn series consists of shallow, red, well-drained to excessively drained soils on undulating, rolling, hilly, and steep relief (fig. 11). They have a brown to yellowish-brown surface soil, a weakly developed subsoil or none, and reddish and reddish-brown shaly and sandy loam parent material.

Penn loam, undulating phase (Pc) (Capability unit IIIe–5).—This excessively drained soil has developed from weathered products of fine-grained to coarse-grained, pinkish-red arkosic sandstone of the Triassic Lowland. Runoff is medium, and internal drainage is rapid. This soil is associated with the other Penn soils and with Bucks, Readington, Calverton, and Croton soils. Areas are in the Bucks-Penn-Calverton, the Penn-Calverton-Croton, and the Penn-Penn (cobbly)-Bucks soil associations.

Profile in a cultivated area:

Surface soil—
0 to 7 inches, yellowish-brown, pale-brown, and grayish-brown, very friable loam to fine sandy loam; weak, fine, granular structure.

Subsurface—
7 to 14 inches, yellowish-brown, brownish-yellow, reddish-brown, and red, friable loam to silt loam soil mixed with many sandstone fragments of similar colors.

Parent material—
14 to 19 inches, pinkish-red, red, reddish-brown, pale-brown, weak-red, and white sandstone fragments mixed with loam, fine sandy loam, and sandy loam soil materials; the sandstone fragments make up 70 to 90 percent of the soil mass.

In a small acreage the surface soil is sandy loam. In many places a thin silt loam, loam, or fine sandy clay loam subsoil has formed. The depth to bedrock ranges from 14 to 45 inches but averages about 27 inches. In many places the parent rock is uniformly sandstone. However,

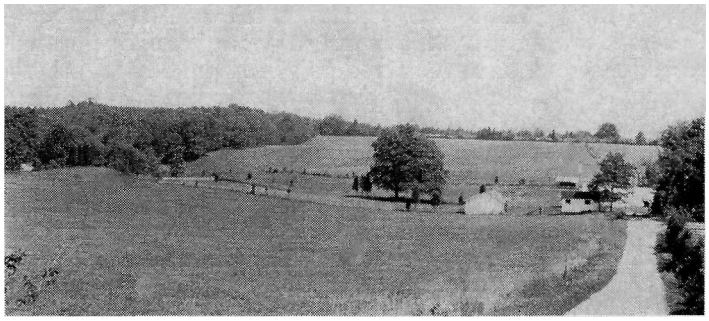


Figure 11.—Landscape in the area of Penn, Bucks, and Manassas soils. The small farm is operated by a part-time farmer.

where the soil is transitional to Penn silt loam, undulating phase, the parent rock consists of parallel strata of coarse-grained sandstone, fine-grained sandstone, and shale or shaly sandstone. Also, the surface soil ranges from coarse sandy loam to silt loam but is mostly loam. Cobbles and gravel occur in some areas of Penn loam, undulating phase. These areas are generally underlain by sandstone conglomerate. A few river cobbles, up to 6 inches in diameter, are on some areas of this soil near stream terraces. The cobbly and gravelly areas are shown on the soil map by symbol.

This soil is very strongly acid to extremely acid and low in fertility. The surface soil and subsoil are rapidly permeable. The capacity to hold water that plants can use is low. The soil is fairly easy to work and conserve. The risk of erosion is moderate to high. In some areas deep gullies have formed.

Use and suitability.—Most of this soil is in crops and pasture. Small parts are in cutover forest or are idle. Management practices like those used on Penn silt loam, undulating phase, are commonly used on this soil, and requirements are similar. This soil, however, has coarser texture and is therefore more readily eroded and leached. It needs slightly heavier applications of complete fertilizer and more erosion control than the undulating phase of Penn silt loam. Less lime, however, is needed. This soil is slightly more restricted in the number of suitable crops. However, it is better suited to vegetable crops and can be used for a greater variety of them.

Penn loam, rolling phase (Pd) (Capability unit IVs–2).—This soil occupies slopes leading from smooth upland ridge crests and is generally near areas of Penn loam, undulating phase. It differs from the undulating phase mainly in having stronger slopes and a slightly shallower profile. Runoff and internal drainage are rapid, and the hazard of erosion is high. Some small areas with deep gullies and some with a sandy loam surface soil are included.

Use and suitability.—About all of this soil was once cleared and cultivated. Most of the acreage is now in permanent pasture or is idle. A few small areas have reverted to woods, and some are still cultivated.

Mainly because of its rolling relief, high risk of erosion, and shallowness, this soil is most suitable for pasture. Complete fertilizer, lime, and careful grazing are needed. The soil responds well to manure and other organic matter.

Penn loam, hilly phase (Pe) (Capability unit VIIe–2).—This soil is on very strongly sloping hillsides near

streams in the more deeply dissected areas of the Triassic Lowland. It is similar to Penn loam, undulating phase, but it has steeper slopes and is somewhat shallower. Runoff is rapid to very rapid, and internal drainage is rapid. Included with this soil are some small areas that have occasional deep gullies and some with a sandy loam surface soil.

Use and suitability.—Most of this soil is in forest and pasture. There are a few areas in crops, and a few are idle. Because this soil is hilly, shallow, and readily eroded, it is more suitable for pasture or forest than for crops. It requires intensive management for pasture—practices similar to those required on the rolling phase. Such practices should include use of complete fertilizer, lime, and grazing control.

Penn silt loam, undulating phase (Pm) (Capability unit IIIe–5).—This red, shallow soil has developed over Triassic shale and sandstone. It is on low, smooth uplands and narrow ridges. Runoff is medium, and internal drainage is medium to rapid. This soil is associated with the Bucks, Readington, Calverton, and Croton soils. It differs from the shallow Catlett soils mainly in its darker red color.

Profile in a cultivated area:

Surface soil—
0 to 7 inches, reddish-brown, very friable silt loam; weak, fine, granular structure; few, small, shaly sandstone fragments.
Subsurface—
7 to 18 inches, red to dark-red, friable silt loam; blocky, slightly weathered, shaly sandstone fragments make up 40 to 60 percent of the soil mass.
Parent material—
18 inches +, red, fairly hard, shaly sandstone.

In cultivated areas the surface soil ranges from yellowish brown to yellowish red in color and from 4 to 8 inches in thickness. In places, small areas of shaly silt loam and loam are present. Some loose shale, gravel, and bedrock outcrops occur locally. The depth to bedrock ranges from 10 to 35 inches but averages about 24 inches. The deeper areas occur over siltstone or mudstone. The shallow areas overlie harder, more resistant shale and sandstone. In many places there is a thin, weakly developed subsoil similar in color to that of the Bucks soil.

This soil is strongly to very strongly acid and low in organic matter and fertility. Permeability is moderately rapid. Because of shallowness, the soil is droughty and has a low capacity to hold water that plants can use. It is easy to work and to conserve under intensive cultivation.

Use and suitability.—Most of the acreage of this soil has been cleared and is chiefly in crops and pasture. The rest is in cutover forest or is idle. Crop rotations are generally 3 to 5 years in length. A common rotation is corn, small grain, and hay. Alfalfa is grown in the rotation on a few farms, but yields are low and the stands do not last long. The best yields of all crops are produced on dairy farms where plenty of manure is available.

This soil is best suited to small grain and hay crops, including red clover, timothy, lespedeza, orchardgrass, and fescue. Corn, ladino clover, and many row crops grow well if sufficient manure or crop residue is used, high fertility is maintained, and rainfall is adequate and well distributed. Alfalfa is not well suited and can be grown best in mixtures. Heavy applications of lime and complete fertilizer are needed. In most seasons yields are restricted mainly by lack of moisture. Irrigation may be practical in places and will help increase yields. Deep plowing and the use of manure and of crop residues are all good practices.

Penn silt loam, eroded undulating phase (Pn) (Capability unit IIIe–5).—This soil occupies smooth upland ridges and narrow ridgetops in the Triassic Lowland. Up to 75 percent of the surface soil has been lost through erosion, and a few gullies have formed. This soil is shallower than Penn silt loam, undulating phase, and has more shale particles throughout. Runoff is medium to rapid, and internal drainage is medium to rapid. This soil is associated with the other Penn soils.

Use and suitability.—Most of this soil was once cleared and cultivated, but much of it is now idle and in pasture. A small part is in pine forest and crops. Except for the more severely eroded areas, which probably can be used best for pasture, this soil is fairly well suited to small grain and mixed hay crops. Mainly because of shallowness, the soil is droughty and has a low capacity to hold water that plants can use. Heavy applications of manure, crop residues, lime, and complete fertilizer are needed to produce good yields. Management practices required for cultivated areas are the use of close-growing or sod crops, deep plowing, contour cultivation, and irrigation. Irrigation may be practical for pastureland.

Penn silt loam, rolling phase (Po) (Capability unit IVs–2).—This soil is similar to Penn silt loam, undulating phase, but has stronger slopes, slightly less depth to bedrock, slightly more erosion, and a lower capacity to hold water that plants can use. Both runoff and internal drainage are medium to rapid. In places, shallow and deep gullies have formed. This soil varies somewhat in texture. Shale fragments, pieces of gravel, and rock outcrops occur in places.

Use and suitability.—A large part of this soil is in pasture, and a considerable part is idle or in crops. A small part is in forest. This soil is managed like Penn silt loam, undulating phase, but it needs erosion control practices, particularly if row crops are grown. These practices should include contour cultivation, use of more sod crops in the rotation, and, in places, stripcropping. This soil is not suited to so wide a variety of crops as Penn silt loam, undulating phase. Its best use is for permanent pasture. Small grain and hay crops, except alfalfa, can be grown under good management in some areas. Lime, manure, and complete fertilizer or fertilizer containing phosphate and potash are needed to maintain high fertility for permanent pasture.

Penn silt loam, eroded rolling phase (Pp) (Capability unit VIIe–2).—This soil occupies short slopes from ridge crests near the upper reaches of drainageways. It has stronger slopes and more erosion than Penn silt loam, undulating phase. Runoff and internal drainage are rapid, and the hazard of further erosion is high.

Use and suitability.—Most of the acreage of this soil is in pasture and idle areas. The rest is in pine forest or crops. This soil is most suitable for pasture or forest. Very intensive management practices, similar to those needed on Penn silt loam, eroded undulating phase, are required to produce crops and pasture on this soil.

Penn silt loam, hilly phase (Pr) (Capability unit VIIe–2).—This soil is similar to Penn silt loam, undulating phase, in most profile characteristics, but it has stronger

500057—60——7

slopes. The depth ranges from 4 to 26 inches but averages about 18 inches. Runoff is rapid to very rapid, and internal drainage is medium to rapid. The hazard of erosion is high to very high.

Use and suitability.—Hilly relief and shallowness restrict the use of this soil. Most of it is in forest and permanent pasture. Most trees grow slowly because the soil is shallow and droughty. Virginia pine and cedars grow most rapidly on cutover areas. Pasture will produce fairly well, if managed intensively. Good pasture practices are seeding, grazing control, and the use of complete fertilizer, manure, and lime.

Penn shaly silt loam, eroded undulating phase (Pf) (Capability unit IIIe–5).—This red, very shallow to shallow soil has formed from partly weathered red shale of the Triassic Lowland. Its extensive acreage occurs in small, widely scattered areas. Runoff is medium to rapid, and internal drainage is rapid. Some areas are shallow because of erosion; others are shallow because the shaly parent material weathers slowly. This soil is associated with the Bucks soils and other Penn soils. Areas are in the Penn-Calverton-Croton and the Penn-Penn (cobbly)-Bucks soil associations.

Profile in a cultivated area:

Surface soil—
0 to 5 inches, reddish-brown, friable shaly silt loam; reddish-brown, partly weathered, small, angular shale fragments make up 25 to 50 percent of the soil mass.

Subsurface—
5 to 10 inches, reddish-brown and light reddish-brown, partly weathered, small, angular shale fragments mixed with a small quantity of reddish silt loam soil material; a small quantity of reddish silty clay loam occurs in pockets between shale layers in places.

Parent rock—
10 inches +, red Triassic shale.

The depth to bedrock ranges from 6 to 22 inches but averages about 10 inches. The parent rock is mostly shale but contains shaly sandstone, mudstone, and siltstone.

This soil is strongly to very strongly acid and low in organic matter and fertility. It has a low to very low capacity to hold water that plants can use. Permeability is rapid throughout.

Use and suitability.—Nearly all of this soil has been cleared and is in crops and pasture or is idle. The crops grown and management used are similar to those on Penn silt loam, undulating phase. However, this soil is less productive of all crops than the undulating phase and requires more intensive management.

Penn shaly silt loam, eroded rolling phase (Pg) (Capability unit VIIe–2).—This soil has stronger slopes and shallower depth to bedrock than Penn shaly silt loam, eroded undulating phase, but is otherwise very similar. It occurs on slopes near drainageways. Runoff and internal drainage are rapid. The capacity to hold water that plants can use is low. The hazard of further erosion is high. Some deep gullies have formed in a few areas.

Use and suitability.—A large part of this soil is in pasture and crops. Crop yields are low. Most of the soil is best suited to pasture and forest. Forests consist mostly of slow-growing scrub pines. Needs are similar to those of Penn silt loam, undulating phase, but more intensive management is required.

Penn shaly silt loam, eroded hilly phase (Ph) (Capability unit VIIe–2).—This excessively drained, red soil occupies deeply dissected areas near streams. Except for its hilly relief and shallower profile, it is similar to Penn shaly silt loam, eroded undulating phase. Runoff is rapid to very rapid, and internal drainage is rapid. A few areas of Penn silt loam, eroded hilly phase, are included. This soil is associated with other Penn soils.

Use and suitability.—Most of this soil is in forest—its most suitable use. The trees are Virginia pine, hickory, redcedar, dogwood, and white, red, scarlet, and black oaks. Trees grow slowly.

Penn shaly silt loam, eroded steep phase (Pk) (Capability unit VIIe–2).—This soil occurs on steep slopes along some of the larger streams. It is more severely eroded than the eroded hilly phase and the eroded undulating phase of Penn shaly silt loam and contains areas that have a loam texture. A few rock outcrops are present. Most areas have lost practically all of the surface soil through erosion. Runoff is very rapid, and internal drainage is rapid.

Use and suitability.—Most areas are in forest, for which this soil is best suited.

Penn cobbly silt loam, undulating phase (Pc) (Capability unit IIIe–5).—This red, shallow soil is similar to Penn silt loam, undulating phase, but has a large number of river cobbles on the surface. The cobbles are evidently remnants of old river deposits. Nearly all of this soil is east of Lucketts in the northeastern part of the county. Runoff is medium, and internal drainage is rapid. This soil is associated with other Penn and Bucks soils of the uplands and with the Captina and Hiwassee soils of the terrace lands.

Included are a few small spots of fairly well developed soils that resemble Bucks cobbly silt loam and Hiwassee cobbly loam. The general location of these inclusions are shown on the soil map by stone symbol. Some areas with a cobbly loam and fine sandy loam surface soil resemble Penn loam, undulating phase.

Use and suitability.—Most of the acreage of this soil has been cleared and is in crops, pasture, and idle areas. A small part is in cutover forest. Management practices and needs are similar to those of Penn silt loam, undulating phase, but pasture and crop yields are less. Most of the cobbles are on or in the surface layer and can be removed during one or two crop rotations by hand or by stone-picker machines.

Penn cobbly silt loam, rolling phase (Pb) (Capability unit VIs-5).—This soil has stronger slopes and a slightly shallower profile than Penn cobbly silt loam, undulating phase. It is in the same general area but is not as extensive. Runoff and internal drainage are rapid. This rolling phase is more erodible than the undulating phase and has lost much surface soil. A few gullied areas are included with this soil. A cobbly loam that has a surface soil of a texture similar to that of Penn loam, rolling phase, is included in places.

Use and suitability.—Most of the acreage of this soil is in crops, pasture, and idle areas. A small part is in forest. The soil is most suitable for permanent pasture because of its rolling relief, shallowness, and numerous cobbles. The management practices suggested for Penn silt loam, undulating phase, should produce good results. Pasture management should include the use of lime, manure, complete fertilizer, and grazing control. Pas-

ture irrigation is needed more than on smoother areas, but it may not be feasible under many conditions.

Penn stony silt loam, eroded hilly phase (Ps) (Capability unit VIIe-2).—This excessively drained soil has developed on abruptly breaking upland slopes. The parent material was weathered shale and shaly sandstone. It resembles Penn shaly silt loam, eroded hilly phase, but has shale outcrops and shaly sandstone bedrock on 5 to 25 percent of its surface. Runoff is rapid to very rapid, and internal drainage is rapid. The risk of further erosion is high to very high. The capacity to hold water that plants can use is low to very low. A few areas are gullied.

Use and suitability.—Most of this soil is in forest, for which it is best suited.

Penn stony silt loam, eroded steep phase (Pt) (Capability unit VIIe-2).—This soil occurs on abruptly breaking slopes in deeply dissected areas near larger streams in the Triassic Lowland. It has stronger slopes and is shallower than Penn stony silt loam, eroded hilly phase. Depth to bedrock ranges from a thin film to 18 inches but averages about 12 inches. Runoff is very rapid, and internal drainage is rapid. Some areas are gullied; others have precipitous slopes and ledges.

Use and suitability.—Nearly all of this soil is in forest —its best use. The growth of most trees is extremely slow.

Readington series

The Readington series consists of moderately well drained to well drained soils. These soils have characteristics that are intermediate between the Penn and Calverton soils. Readington soils are 6 to 10 inches thicker than the Penn soils and slightly lighter in color and slightly less well drained. They are browner and shallower than the Calverton soils and do not have the compact horizon, or fragipan, of those soils. Readington soils have a light-brown surface soil and a thin yellowish-red or reddish-yellow subsoil. This subsoil is generally faintly mottled with reddish-gray and red weathered shale and shaly sandstone material. The parent material was derived from nearly level-bedded shaly sandstone, shale, and sandstone.

Only one soil of the Readington series is mapped in the county.

Readington silt loam, undulating phase (Ra) (Capability unit IIIw-1).—This is a moderately well drained to well drained soil of the Triassic Lowland. It is shallow to moderately deep and was developed from the weathered products of almost horizontally bedded shaly sandstone. In drainage, color, depth, relief, and other characteristics, this soil is between the Penn and Calverton soils. It is better developed than the Penn soils and less well developed than the Calverton. Most slope gradients are about 3 percent. Runoff is medium to slow, and internal drainage is slow. This soil is associated with the Penn, Bucks, Calverton, and Manassas soils. Areas are in the Penn-Calverton-Croton and the Calverton-Readington-Croton soil associations.

Profile in a cultivated area:

Surface soil—
0 to 7 inches, strong-brown to reddish-brown, friable silt loam; moderate, fine to medium, granular structure; few, small, red and weak-red shale fragments.

Subsoil—
7 to 16 inches, yellowish-red, friable silty clay loam; weak, fine to medium, subangular blocky structure; few, small, red and weak-red shaly sandstone fragments.

Parent material—
16 to 21 inches, dominantly dark-red and red, firm silty clay loam soil material mottled with light brown, strong brown, and pinkish gray; weak, medium to coarse, subangular blocky structure; many red and weak-red shaly sandstone particles that make red streaks on a cut surface.
21 inches +, weak-red, red, and pinkish-red shaly sandstone particles mixed with small quantities of reddish silt loam soil material; layer generally is a few inches deep over hard, red, shaly sandstone.

Included are areas of Calverton and Penn silt loams, too small to separate; some areas resembling the Bucks soils but lighter colored and with slower internal drainage throughout; and a few areas in depressions near drainageway heads that have a thicker and browner surface soil than the Readington soils and are like the Manassas soils.

This soil ranges from strongly acid to extremely acid but is generally very strongly acid. It has a low amount of organic matter and is low in fertility. Permeability is moderately rapid in the surface soil and moderately slow in the subsoil. The capacity to hold water that plants can use is moderate. This soil is fairly easy to work and conserve and moderately productive of many local crops under intensive management.

Use and suitability.—A large part of this soil is in crops and pasture. Much is idle, and a small part is in forest. Management practices are similar to those used for the associated Penn and Bucks soils. This soil requires lime and complete fertilizer in most rotations because of its acidity and low fertility. It needs manure and crop residues because of its shallowness, low amount of organic matter, and moderate capacity to hold water that plants can use. The soil responds well when organic matter, fertilizer, and lime are applied.

Well-suited crops are corn, sorghum, and mixed hay, including red clover, timothy, fescue, ladino clover, and lespedeza. Corn and sorghum do not yield so well as on the deeper Bucks and Manassas soils. Wheat and other kinds of small grain produce well in drier or normal seasons. Yields are low in wet seasons, mainly because of slow internal drainage. Alternate freezing and thawing causes severe heaving of small grain, alfalfa, and orchardgrass in some seasons.

Robertsville series

The Robertsville series consists of nearly level, poorly drained soils on low stream terraces. These soils are medium textured and are mottled throughout with shades of gray, brown, and red. The parent material has washed from uplands underlain mostly by limestone. In color and drainage, the Robertsville soils resemble the Melvin soils of the bottom lands and the Worsham soils of the colluvial lands. Only one soil of the Robertsville series is mapped in the county.

Robertsville silt loam (Rb) (Capability unit Vw–1).—This inextensive gray soil occurs on low terraces of the Potomac River. It was derived from materials washed from areas underlain principally by limestone. Some of the parent material, however, came from acidic rocks. Runoff and internal drainage are very slow to slow. Some of the lowest areas flood in wetter seasons. This soil is associated with the Elk, Captina, and Sequatchie soils

of the terrace lands, and with the Huntington, Lindside, and Melvin soils of the bottom lands. Areas are in the Captina-Robertsville-Elk soil association.

Profile in a recently cleared area:

Surface soil—
0 to 3 inches, dark grayish-brown, very friable silt loam; weak, fine, granular structure.
3 to 12 inches, firm, heavy silt loam to light silty clay loam mottled with light gray, strong brown, and black; weak, fine platy to moderate, medium, subangular blocky structure.
Subsoil—
12 to 32 inches, plastic, slick silty clay to clay mottled with light gray, strong brown, and black; strong, medium to coarse, blocky structure.
32 to 42 inches, dominantly strong-brown, slightly plastic silty clay loam prominently mottled with gray and yellowish red; weak, medium, platy to moderate, medium, subangular blocky structure; few small quartz pebbles.
Underlying material—
42 inches +, alluvium originating from limestone and sandstone.

In some places the lower subsoil is clay loam. In others the parent material contains strata of very fine sand and fine gravel. Small areas are ponded for several days after rains. Other areas are somewhat poorly drained and resemble Captina silt loam. Areas that are adjacent to coarser textured soils on high stream terraces receive much seepage water and fine to very fine sandy loam material.

This soil ranges from medium acid to very strongly acid. It is strongly acid in most places, an indication that much of the material originated in acidic rocks. The soil has a low amount of organic matter and is low in fertility. The fine-textured subsoil greatly retards infiltration, and a generally high water table is indicated by the prominently mottled gray color of the profile. Permeability is moderately rapid in the surface soil and moderate to very slow in the subsoil. Roots are mainly in the upper surface soil. Soil aeration takes place only in dry periods when the soil is not full of water. This soil has a moderate capacity to hold water that plants can use. Although easy to conserve, it is hard to work and has only limited use.

Use and suitability.—Most of this wet soil is in brush or in forest consisting of sycamore, swamp white oak, willow, sweetgum, and red maple. Much acreage is idle, but a small part is in crops and pasture. Pasture is unproductive and has received little fertilizer or good management because of the wet condition of the soil. Open ditches and drainage of surface water should improve moisture conditions for pasture or forage crops. The heavy subsoil makes tile drainage difficult. Lime, phosphate, and potash are needed, but response to them in many seasons is limited because of the poor drainage. Overgrazing and heavy trampling should be avoided.

Rocky land

Rocky land, rolling acidic rock phase (Rc) (Capability unit VIIs–2).—This miscellaneous land type consists mainly of areas of Brandywine, Chester, Eubanks, and Hazel soils that have many outcrops of bedrock and some loose stone fragments. These outcrops and stones occupy 15 to 40 percent of the surface, and cultivation is not feasible. The soil between the rocks varies considerably in depth and other characteristics. Most slopes are 7 to 14 percent in gradient. Runoff is moderate to rapid, and internal drainage is medium to rapid. Reaction is medium to very strongly acid. A few wet spots occur locally on included nearly level areas. The widely scattered areas of this land type are in the Rocky land and Very rocky land, acidic rock phases-Airmont soil association.

Use and suitability.—Most of the acreage of this land type is in pasture, forest, and idle areas. Only a very small part is in crops. The pasture herbage is mostly broomsedge, bluegrass, whiteclover, hop clover, lespedeza, orchardgrass, and less desirable plants. Where manure, lime, and phosphate or other fertilizer have been used, the pasture consists mainly of bluegrass, whiteclover, and orchardgrass. Pasture is generally less desirable on this land type than on Rocky land, rolling basic rock phase.

Because of its rockiness, this land type is low to moderate in capacity to hold water that plants can use, medium to low in natural fertility, and difficult to work. Its best use is for pasture or forest. Lime and a complete fertilizer containing principally phosphate and potash are required.

Rocky land, hilly acidic rock phase (Rd) (Capability unit VIIs–2).—This land type has stronger slopes than the associated Rocky land, rolling acidic rock phase, and contains shallower soils, principally Brandywine. It occupies deeply dissected uplands, mainly along large drainageways. Runoff is rapid to very rapid, and internal drainage is medium to rapid. The hazard of erosion is high to very high. This land type is very hard to work and conserve, and its use is restricted. Areas are in the Rocky land and Very rocky land, acidic rock phases-Airmont soil association.

Use and suitability.—Most of the acreage of this land type is in trees. A large part is in pasture, and small parts are in crops, brush, and idle areas. It is not suited to cultivation, mainly because of rockiness, hilly relief, and shallowness. It is most suitable for pasture and forest. Pastures require lime and a complete fertilizer containing mostly phosphate and potash. They also need grazing control and protection from erosion.

Rocky land, rolling basic rock phase (Re) (Capability unit VIIs–2).—This miscellaneous land type consists of areas of Montalto, Iredell, Mecklenburg, Fauquier, Myersville, Catoctin, and Ruxton (not mapped in the county) soils that contain many basic rock outcrops and loose stones. These stones and outcrops occupy 15 to 40 percent of the surface, and cultivation is not feasible. Relief is generally smoother than that of Rocky land, rolling acidic rock phase. Runoff and internal drainage generally range from medium to rapid but are slow in the areas of Iredell soil. Wet spots of very stony Elbert soil are included in places.

Reaction ranges from slightly to strongly acid but is medium in most places. Fertility is medium to high. Generally this land type is more difficult to work than Rocky land, rolling acidic rock phase.

Use and suitability.—Mainly because of rockiness, this land type is best for permanent pasture or forest. It produces pastures of better quality than Rocky land, rolling acidic rock phase, because of its higher fertility, larger supply of organic matter, and lower acidity.

Rocky land, hilly basic rock phase (Rf) (Capability unit VIIs–2).—This land type is similar to Rocky land.

rolling acidic rock phase, but has stronger slopes and a larger percentage of shallower soils, that are similar to Legore and Catoctin soils. It occupies mostly deeply dissected uplands near larger streams. Runoff is rapid to very rapid, and internal drainage is medium to rapid.

Use and suitability.—Most of this land type is in forest and pasture, for which it is best suited. Pastures require good management.

Rohrersville series

The Rohrersville series consists of poorly drained to somewhat poorly drained soils on nearly level to gently sloping relief. They have a brown to grayish-brown surface soil and a silty clay to clay subsoil that is mottled strong brown, yellowish red, gray, and yellow. The parent material, weathered chiefly from greenstone, is prominently mottled light gray, gray, yellow, and strong brown. It contains many quartz, greenstone, and manganese particles. The Rohrersville soils have developed from colluvial materials washed from the associated Myersville, Fauquier, and Catoctin soils. They are also associated with the Dyke and Unison soils.

Rohrersville silt loam (Rk) (Capability unit IVw–1).—This poorly drained to somewhat poorly drained soil of the colluvial lands has developed from fine soil materials washed and sloughed from Fauquier, Myersville, and Catoctin soils. These materials have accumulated at the base of slopes and in depressions along drainageways. Runoff is slow to moderately slow, and internal drainage is slow to very slow. Most slopes are about 3 percent, but some of the poorly drained areas are nearly level. This soil resembles the Worsham soil in color, mode of formation, and position. The Worsham soil, however, is mostly poorly drained and has developed from coarser soil materials that washed chiefly from the Chester, Eubanks, and Brandywine soils. Areas of Rohrersville silt loam are in the Myersville-Catoctin-Fauquier soil association.

Profile in a cultivated area:

Surface soil—
0 to 10 inches, dominantly light brownish-gray, friable silt loam faintly mottled with yellowish red, strong brown, yellowish brown and gray; weak, fine, granular structure.
Subsoil—
10 to 30 inches, slightly plastic to plastic silty clay or clay mottled with gray, light yellowish brown, strong brown, and yellow; moderate, medium, subangular blocky structure; some black mineral concretions and pieces of quartz gravel.
Underlying material—
30 inches +, gray, white, grayish-brown, and yellowish-brown plastic silty clay soil material mixed with many greenstone and quartz fragments of similar colors; many black concretions.

In places in somewhat poorly drained areas, the soil has a brown to grayish-brown surface soil, a dominantly yellowish-brown upper subsoil, and a prominently mottled lower subsoil. Gravel and small cobbles occur where this soil is associated with stony upland soils. The depth to bedrock ranges from 6 to 40 feet but averages about 15 feet. In places small black concretions occur on the surface and in the soil.

Rohrersville silt loam is medium to strongly acid and has a moderate amount of organic matter. Fertility is medium to high. Permeability is moderately rapid in the surface soil and slow to moderate in the subsoil. The soil has a moderate to low capacity to hold water that plants can use. It is only fairly easy to work and conserve. The hazard of erosion is none to slight. The range in use is narrow to medium.

Use and suitability.—Most of the acreage of this soil is in permanent pasture. A small part is cultivated, and the rest is in forest and idle areas. Management of crops and pasture is similar to that of the surrounding Myersville, Fauquier, and Catoctin soils. Corn, small grain, and mixed hay are commonly grown in 4- to 6-year rotations. Yields are low except where the soil has been drained.

This soil is best suited to permanent pasture because of the unfavorable drainage. Corn and mixed hay will grow on the drained areas. Alfalfa is not suited. Some areas need to be ditched before good permanent pasture can be established. Light applications of lime and fertilizer, mainly phosphate and potash, are required. Some nitrogen may be needed for grass or corn crops. Ladino clover, fescue, and other grass and legumes tolerant of wet conditions are well suited. Vegetable crops are not suited to this soil.

Rohrersville stony silt loam (Rm) (Capability unit IVw–1).—This somewhat poorly drained soil occupies low, gently undulating to nearly level colluvial lands along the mountain foot slopes. It is underlain by old colluvial beds, mostly of greenstone materials. It resembles the better drained areas of Rohrersville silt loam in color and texture. Stones and cobbles make up 5 to 20 percent of the soil mass. Runoff is medium to slow, and internal drainage is slow. This soil is associated with the Dyke, Unison, and Meadowville soils and Elbert stony silt loam of the colluvial lands, and with Myersville, Chester, and Eubanks soils of the uplands. Areas are in the Dyke-Unison-Elbert soil association.

Profile in a cultivated area:

Surface soil—
0 to 8 inches, yellowish-brown to brown and dark grayish-brown, friable stony silt loam; contains stones a few to 15 inches in diameter; moderate, fine, granular structure.
Subsoil—
8 to 14 inches, brownish-yellow to yellowish-brown, firm silty clay loam (slightly plastic when wet); moderate, fine to medium, subangular blocky structure.
14 to 26 inches, firm silty clay or clay (plastic when wet); mottled with brownish yellow, yellow, and light gray; moderate, medium, subangular blocky structure; a few pieces of gravel and stones up to 6 inches in diameter.
26 to 36 inches, plastic silty clay mottled with brownish yellow, yellow, and light gray; weak, fine, subangular blocky structure; a few stones 6 to 12 inches in diameter; fragments of greenstone and other stones.
Underlying material—
36 inches +, many pieces of greenstone; small quantity of soil material.

Stones and cobbles on the surface soil and in the subsoil range from few to many. In places a plastic, panlike horizon occurs in the lower subsoil. Thin layers of fine quartz gravel are present above this panlike horizon in places. Small, poorly drained spots occur in places and are designated on the soil map by wet-spot symbol.

This soil is medium to strongly acid and has a moderate amount of organic matter. The fertility is medium. Permeability is moderately rapid in the surface soil and moderate to slow in the subsoil. The soil has a moderate

capacity to hold water that plants can use. Because of stoniness and slow internal drainage, the soil is difficult to work and only fairly productive. The hazard of erosion is slight, and the soil is easily conserved.

Use and suitability.—Most of this soil is in permanent pasture, for which it is best suited (fig. 12). Present

Figure 12.—**Beef cattle on permanent pasture on Fauquier and Rohrersville soils.**

management is similar to that of the associated Elbert stony silt loam and Unison soils. Permanent pastures consist mostly of bluegrass, whiteclover, and broomsedge. They receive light applications of lime, phosphate, and potash. If manure is used, phosphate alone will give good results. Although grazing control is important, pasture will stand close grazing well because of good moisture relations, smooth relief, and a moderate amount of organic matter.

Rowland series

The Rowland series consists of somewhat poorly drained to moderately well drained soils. The surface soil is brown silt loam. The subsoil is silt loam to silty clay loam mottled with gray, pinkish gray, yellowish red, and red.

The Rowland soils, in drainage and most physical characteristics, are intermediate between the Bermudian and the Bowmansville soils. They are similar to the Chewacla and Lindside soils in the county and are in the same capability grouping. They are, however, more acid than the Lindside soils. Only one soil of the Rowland series is mapped in the county.

Rowland silt loam (Rn) (Capability unit IIIw–2).—This soil has developed on first bottoms from materials washed principally from the Triassic Lowland. It is associated with the poorly drained Bowmansville silt loam and the well-drained Bermudian silt loam and has characteristics that are intermediate between these two soils. It is subject to floods, which deposit fresh soil material. Runoff and internal drainage are slow. This soil resembles Chewacla silt loam and Lindside silt loam but has different parent materials. Rowland silt loam was derived from sandstone and shale, Chewacla silt loam from crystalline rock, and Lindside silt loam from limestone. Areas of Rowland silt loam are in the Rowland-Bowmansville-Bermudian soil association.

Profile in a cultivated area:

Surface soil—
0 to 10 inches, reddish-brown to brown silt loam; weak, fine, granular structure.

Subsoil—
10 to 18 inches, dominantly brown, friable silty clay loam mottled with yellowish brown, pinkish gray, and gray; weak, fine to medium, subangular blocky structure that crushes easily to weak, fine, granular structure.
18 to 32 inches, firm silty clay loam to clay (slightly plastic when wet) distinctly mottled with yellowish brown, strong brown, light gray, and red; moderate, medium to coarse, subangular blocky structure; stratified in lower part with very fine sandy loam.

In places along the upper courses of small drainageways, this soil closely resembles Manassas silt loam and grades toward it. Sandbars and very fine sandy loam textures are common near creek banks. In some wet spots, the soil resembles Bowmansville silt loam. In well-drained areas it resembles Bermudian silt loam. Mottles of gray generally appear at depths of 6 and 16 inches but in a few areas are below 20 inches. Quartz-and-shale gravel is scattered near the outlets of intermittent drainageways and along eroded slopes.

Rowland silt loam is medium to strongly acid, moderate in organic matter, and medium in fertility. Permeability is moderately rapid in the surface soil and moderate to moderately rapid in the subsoil. The capacity to hold water that plants can use is moderate. The water table rises in the subsoil in wetter seasons. This soil is fairly easy to work, but this condition varies abruptly with slight changes in moisture. It is very easy to conserve.

Use and suitability.—Most of the acreage of this soil is in pasture and crops, and the rest is in forest and idle areas. Corn and mixed hay crops are grown in short rotations in some areas. Most rotations, however, are similar to those used on the associated Penn, Bucks, and Calverton soils of the uplands. Rowland silt loam is fairly well suited to corn, and mixed hay and forage crops, such as ladino clover and fescue, but stream overflow and slow internal drainage restrict its use. Artificial drainage might increase yields, but it would broaden the use and suitability very little. Alfalfa is not suitable, mainly because of slow internal drainage. The high amount of organic matter makes small grain lodge badly. Moisture conditions are poor for cultivation. The selection of moisture-tolerant crops and the use of small quantities of lime, phosphate, and potash are needed to produce high yields. Nitrogen may be needed on a few areas that have been cropped continuously to corn.

Sequatchie series

The soils of the Sequatchie series in this county are on low stream terraces along the Potomac River. They have a brown, thick fine sandy loam surface soil and a reddish-brown, friable loam to fine sandy clay loam subsoil. The underlying material is brown, light-brown, and reddish-brown, friable fine sandy loam to sandy loam, mixed with some small pebbles and quartz particles. The Sequatchie soils resemble the Elk soils in many characteristics but are more sandy and more acid. Only one soil of the Sequatchie series is mapped in the county.

Sequatchie loam (Sq) (Capability unit IIe–3).—This well-drained, deep, brown soil has developed from mixed

alluvium that originated from sandstone, shale, and some limestone. Runoff is slow to medium, and internal drainage is medium to rapid. A few areas are covered with water during extremely high floods. This soil resembles Elk loam but differs in parent material. It is associated mainly with the Captina and Elk soils of the terrace lands and with the Huntington, Lindside, and Melvin soils of the bottom lands. Areas are in the Captina-Robertsville-Elk and the Huntington-Lindside-Melvin soil associations.

Profile in a cultivated area:

Surface soil—
0 to 11 inches, brown to dark-brown, very friable loam; weak, fine, granular structure.
Subsoil—
11 to 36 inches, reddish-brown to yellowish-red friable loam to light fine sandy clay loam (slightly sticky when wet); weak, fine to medium, subangular blocky structure that crushes easily to weak, fine, granular structure.
Underlying material—
36 to 57 inches, strong-brown, friable to firm loam to silt loam soil material mottled with yellow, pale brown, and black; weak, fine, subangular blocky structure; some weak, platy structure; stratified material in the lower part.

The surface soil ranges in texture from loam to fine sandy loam, and the subsoil, from fine sandy loam to heavy fine sandy clay loam. Strata of sandy material occur at depths less than 36 inches in places but are generally below 50 inches. On some of the highest areas near old drainageways, internal drainage is somewhat impeded by compact, weak, platy layers in the subsoil.

Sequatchie loam is slightly to very strongly acid and has a moderate amount of organic matter. It is medium in natural fertility. The capacity to hold water that plants can use is high. The erosion hazard is none to slight. Permeability is rapid in the surface soil and moderate to moderately rapid in the subsoil.

Use and suitability.—Nearly all of Sequatchie loam is used for crops. It is well suited to most local crops because of good depth and drainage, medium fertility, and good capacity to hold water that plants can use. In addition, it is easy to work and conserve. It is, therefore, well suited to intensive cultivation. Corn, sorghum, vegetables, and hay crops are most suitable. In normal seasons, most small grain grows well under proper management. Alfalfa produces well, but the stands die out more quickly than on finer, less moist soils. This soil needs light applications of phosphate and potash fertilizers, as well as lime, to produce good yields. Short rotations could be used in many places.

Stony colluvial land

Stony colluvial land, rolling and hilly phases (Sb) (Capability unit VIIe–3).—This extremely stony land type occupies colluvial positions near drainage heads and mountain hollows and foot slopes. It is not extensive. The depth ranges from a thin film to 3 feet but averages about 1 foot. Runoff and internal drainage are very rapid.

This land type was derived from materials that rolled and sloughed from basic and acidic rocky land types along the Blue Ridge and Short Hill. Most areas are made up of 75 to 95 percent loose stones and boulders intermixed with small patches of soils that resemble Airmont, Unison, Dyke, and Meadowville soils. About half of the colluvial material has washed from basic rock areas, mainly greenstone, and the other half from acidic rock areas, mainly quartzite. The soils among the basic rocks resemble the Unison, Dyke, and Meadowville soils or soil materials. Those among the acidic rocks resemble the Airmont soils or soil materials. Small wet spots occur locally. In places, especially in upper mountain hollows, large stones and boulders are piled on each other to depths of 6 feet or more. At other places, usually on the wider foot slopes, there are small patches of brown soil among the rocks. These provide a little pasture. Most areas of this land type are medium to strongly acid. The acidity is greater in the areas among acidic rock materials. This land type is associated with other rocky land. Areas are in the following soil associations: Rocky land and Very rocky land, basic rock phases—Clifton; and Rocky land and Very rocky land, acidic rock phases—Airmont.

Use and suitability.—This land type is used for trees, for which it is best suited. The timber is mainly poplar, white oak, red maple, locust, walnut, and sycamore. Good woodland management includes fire prevention and selective cutting.

Thurmont series

In the Thurmont series are well drained to moderately well drained soils. They have a brown surface soil and a yellowish-red and strong-brown silty clay loam to silty clay subsoil. The parent material is silty clay loam mottled with yellowish red, light gray, yellow, and strong brown. It contains many weathered fragments of greenstone, mica schist, quartzite gravel, and other rock. The Thurmont soils, in many characteristics, are intermediate between the Braddock and Trego soils. They are similar to the Unison soils in color and drainage.

Thurmont gravelly loam, undulating phase (Tc) (Capability unit IIe–4).—This soil has formed over old colluvial beds of mixed greenstone, schist, and quartzite materials. These materials, which rolled or washed from the Piedmont Upland and the Blue Ridge, came mostly from Myersville, Catoctin, Glenelg, Manor, and Buckingham soils. In the surface soil, small quartz gravel composes 25 to 40 percent of the soil mass. The subsoil contains less gravel. This soil has medium to slow runoff and medium internal drainage. It resembles Unison silt loam, undulating phase, of the old colluvial lands but differs in parent material and has coarser texture throughout. It is associated with Braddock and Trego soils of the colluvial lands, and with Athol, Chester, and Penn soils of the uplands. Areas are in the Braddock-Thurmont soil association.

Profile in a cultivated area:

Surface soil—
0 to 8 inches, dark yellowish-brown to brown, very friable, gravelly loam to silt loam; weak, fine, granular structure.
8 to 11 inches, strong-brown, friable, gravelly silty clay loam; moderate, medium, subangular blocky structure that crushes easily to moderate, coarse, granular structure.
Subsoil—
11 to 28 inches, strong-brown to yellowish-red, friable, heavy silty clay loam to clay; moderate, medium, subangular blocky structure; many pieces of quartz gravel in lower part of layer.
Underlying material—
28 to 60 inches, old colluvial beds composed mainly of many angular quartz and greenstone gravel and stones ¼ to 6

inches across, mixed with firm (slightly plastic when wet), heavy silty clay loam or clay soil material; mottled strong brown, yellowish red, brownish yellow, and light olive brown.

60 inches +, buried Athol soil; the clay content of the material increases with depth.

In some recent deposits along drainageways and in depressions, the surface soil ranges from 5 to 15 inches in thickness and from dark brown to light yellowish brown in color. In these areas the proportion of gravelly silt loam and gravelly loam in the surface soil is about equal. A few loose stones, cobble fragments, and limestone outcrops occur in some areas. Small areas of Athol gravelly silt loam, Braddock gravelly silt loam, and Airmont gravelly loam are included in places. These soils are not mapped separately in the county.

Thurmont gravelly loam, undulating phase, is medium to strongly acid. It has a moderate amount of organic matter and medium fertility. Permeability is rapid in the surface soil and moderate to moderately slow in the subsoil. This soil has a high capacity to hold water that plants can use and retains added plant nutrients well. It is easy to work and conserve and produces a wide variety of crops.

Use and suitability.—Most of the acreage of this soil is in crops and pasture. A small part is in forest or is idle. Crop rotations lasting 4 to 5 years are common. They include corn, small grain, mixed hay, and alfalfa. Short rotations are well suited under good management. Corn, small grain, and most hay and forage crops do well. Small grain is better suited than corn, however, and mixed hay is more suitable than alfalfa, especially on some of the low moderately well drained areas that are smoother than normal.

This soil needs lime and complete fertilizer that contains mostly phosphate and potash, as well as manure and crop residues. Contour plowing, the growing of sod crops, and other erosion control practices are needed on the stronger undulating slopes.

Thurmont gravelly loam, rolling phase (Td) (Capability unit IIIe–8).—This soil has stronger slopes and a shallower profile than Thurmont gravelly loam, undulating phase. It occurs on slightly higher positions on colluvial lands. Runoff is medium to rapid, and internal drainage is medium. This soil is more erodible than the undulating phase, and much surface soil has been lost in some areas. Small acreages of Airmont loam, rolling phase, and Thurmont gravelly loam, hilly phase, are included. These soils are not mapped separately in the county. Areas of Thurmont gravelly loam, rolling phase, are in the Braddock-Thurmont soil association.

Use and suitability.—A large percentage of this soil is in crops and pasture. Management practices are similar to those used on Thurmont gravelly loam, undulating phase. Some erosion control practices are needed, however. These include contour cultivation, use of more sod crops in the rotation, and stripcropping, particularly on the more rolling areas. This soil will produce most local crops. It responds readily to good management but is only fairly easy to work and conserve. Pasture may be best for the steeper, more gravelly areas.

Thurmont cobbly loam, undulating phase (Ta) (Capability unit IIIe–8).—This soil occurs on old colluvial beds of mixed greenstone, schist, and quartzite rock materials. In position it is similar to Thurmont gravelly loam, undulating phase, but differs in having loose cobbles on the surface and in the profile. These cobbles compose up to 25 percent of the soil mass, and together with a few angular stones, make cultivation difficult. Runoff is medium to slow, and internal drainage is medium. This soil is associated with the Thurmont gravelly loam soils and with Braddock and Trego soils of the colluvial lands.

Use and suitability.—Most of this soil is in crops and pasture, for which it is best suited. Mainly because of cobbles, the soil is more difficult to work and more limited in use than Thurmont gravelly loam, undulating phase. Also, yields of most crops are less under similar management. The loose cobbles and stones can be removed, but more stones are turned up at each plowing. Management requirements are similar to those for Thurmont gravelly loam, undulating phase, but results are less favorable.

Thurmont cobbly loam, rolling phase (Tb) (Capability unit IVs–3).—This soil is similar to Thurmont cobbly loam, undulating phase, except in slope and depth. Slopes range from 7 to 30 percent but are generally between 10 and 20 percent. Runoff is rapid, and internal drainage is medium. Much surface soil has eroded in some areas, and a few shallow gullies have formed.

Use and suitability.—Most of this soil is in trees. However, a considerable part is in pasture, and a small part is in crops and idle areas. Because of stoniness and strong slopes, this soil is best suited to permanent pasture and forest. The steeper slopes, however, are most suitable for forest in many places. Pastures need lime, fertilizer that contains chiefly phosphate and potash, and grazing control.

Trego series

The Trego series consists of somewhat poorly drained soils that occur in low positions on the colluvial slopes with Braddock and Thurmont soils. The surface soil is grayish brown to brown. The subsoil is silty clay loam to silty clay mottled with yellowish brown, strong brown, gray, and reddish yellow. The parent material is friable silt loam to silty clay loam prominently mottled with gray, yellowish red, yellow, and strong brown. It contains many weathered fragments of mica schist, greenstone, and quartzite. The Trego soils resemble the Rohrersville soils in position, drainage, color, and general appearance. Only one soil of the series is mapped in the county.

Trego gravelly silt loam (Te) (Capability unit IIIw–1).—This soil occurs on smooth, low colluvial lands along mountain foot slopes. It resembles the Rohrersville soils that formed on colluvial lands from greenstone. It is farther from the mountain slopes than most soils of the colluvial lands, and relief is nearly level to very gently sloping in many places. Many areas are near drainageways. This soil has developed from greenstone, schist, and quartzite materials. Runoff is medium to slow, and internal drainage is slow. The soil is associated with Braddock and Thurmont soils and Chewacla silt loam. Areas are in the Braddock-Thurmont soil association.

Profile in a cultivated area:

Surface soil—

0 to 10 inches, yellowish-brown to brown, very friable gravelly silt loam with a few, faint, fine, pale-brown mottles in the lower part; weak, fine, granular structure.

Subsoil—
10 to 14 inches, brownish-yellow, friable silt loam to light silty clay loam; moderate, fine to medium, subangular blocky structure.
14 to 18 inches, dominantly yellowish-brown, friable, smooth very fine sandy clay loam faintly mottled with very pale brown and strong brown; moderate to strong, medium, subangular blocky structure; many small mica flakes.
18 to 22 inches, dominantly yellowish-brown, firm fine sandy clay loam, mottled with pale brown, light gray, and strong brown; strong, medium, subangular blocky structure; many mica flakes.
22 to 32 inches, firm, light loam or silt loam mottled with pale brown, light gray, strong brown, and yellowish brown; moderate, medium, subangular blocky structure; many mica flakes and some black films.
Underlying material—
32 to 42 inches, strong-brown, yellowish-brown, very pale-brown, and light-gray sandy clay loam; black concretions and many small mica flakes; weak, medium, platy structure to weak, medium, subangular blocky structure; this material probably is a horizon of a buried soil.

The surface soil ranges from gravelly loam to gravelly silt loam in texture and from 6 to 20 inches in thickness. It has gray mottles in the wetter places. The subsoil ranges from loam through silty clay loam and clay loam to silty clay in texture and from 10 to 40 inches in thickness. The amount of gravel on and in the soil varies. Mica flakes occur in most places. Since this soil is mostly along the outer edge of old colluvial fans, the underlying colluvial beds are thin and are finer textured than those closer to the source. The profile is more strongly developed in this soil than in the other colluvial soils. Inclusions near larger drainageways are Mixed alluvial land and Chewacla silt loam.

Trego gravelly silt loam is medium to strongly acid, low to moderate in organic matter, and low to medium in fertility. Permeability is moderately rapid in the surface soil and slow in the subsoil. This soil has a moderate capacity to hold water that plants can use and retains plant nutrients well. Slow internal drainage restricts the number of suitable crops. The moisture range for satisfactory tillage is narrow.

Use and suitability.—Nearly all of the acreage of Trego gravelly silt loam is in cultivated crops. A small part is in pasture, and a very small part is in forest, brush, and idle areas. Management practices are similar to those used on the Braddock and Thurmont soils. This soil is best suited to corn and mixed hay crops, especially to moisture-tolerant hay or forage. Alfalfa is not suited. Ladino clover, fescue, orchardgrass, alsike clover, red clover, and some small grain are grown. Lodging reduces small grain yields in some seasons. Orchardgrass is not as well suited as fescue, timothy, or redtop.

Lime and fertilizer that contains chiefly phosphate and potash are needed. This soil responds well to manure and crop residues, but the need is less than on the drier, less fertile soils.

Unison series

The Unison series consists of well drained to moderately well drained soils on the colluvial slopes. These soils have a brown, friable silt loam surface soil and a strong-brown to yellowish-red silty clay to clay subsoil. The parent material is silt loam to silty clay loam mottled with yellowish brown, strong brown, yellowish red, red, and reddish yellow. It contains many yellowish greenstone fragments, brown manganese particles, and white quartz gravel and stone. Loose gravel and cobbles are common in some areas.

The Unison soils are intermediate in color, drainage, and other characteristics between the Dyke and Rohrersville soils. They resemble the Myersville soils of the uplands, but they have a thicker, slightly lighter colored, and a finer textured subsoil. In addition their internal drainage is slower. They also resemble the Thurmont soils of the colluvial lands but have developed from different parent material and do not have a gravelly surface soil.

Unison silt loam, undulating phase (Ua) (Capability unit IIe–4).—This soil has formed over old colluvial beds consisting mostly of greenstone materials. Most areas are along the foot slopes of the Blue Ridge. Runoff and internal drainage are medium to slow. A few cobbles and stones are on the surface and in the soil layers. This soil is associated with the Dyke, Rohrersville, and Meadowville soils, and Elbert stony silt loam, colluvial phase, of the colluvial lands; and with Chester, Brandywine, Eubanks, and Myersville soils of the uplands. Areas are in the Dyke-Unison-Elbert soil association.

Profile in a cultivated area:

Surface soil—
0 to 8 inches, brown to yellowish-brown, friable, heavy silt loam; moderate, medium, granular structure; a few angular greenstone fragments and quartz gravel.
Subsoil—
8 to 13 inches, strong-brown, firm silty clay loam; weak to moderate, fine to medium, subangular blocky structure; a few partly weathered greenstone fragments and small black concretions.
13 to 22 inches, yellowish-red, mingled with red, firm (slightly plastic when wet), heavy silty clay loam; weak to moderate, medium, subangular blocky structure; a few greenstone and quartz fragments; some black concretions.
22 to 34 inches, yellowish-red, firm (slightly plastic when wet), heavy silty clay loam to light silty clay; strong, fine to medium, subangular blocky structure; many greenstone fragments and concretions.
Underlying material—
34 to 50 inches, firm silty clay loam soil material distinctly mottled with yellow, brownish yellow, red, and yellowish red; mixed with many olive-yellow, yellow, red, and greenish greenstone fragments and black concretions; rock fragments are more numerous and concretions less numerous in the lower part of the layer.

The amount of stone and gravel varies greatly. Small mineral concretions occur in the subsoil in most but not all areas. Subsoil textures are silty clay loam, silty clay, and clay. In most profiles the second and third subsoil layers range from slightly plastic to plastic when wet.

This soil ranges from medium acid to strongly acid but is medium acid in most places. The risk of erosion is slight to moderate. Permeability is moderately rapid in the surface soil and moderately slow to moderate in the subsoil. The capacity to hold water that plants can use is high to very high. The soil is easy to work and conserve and is suitable for many local crops.

Use and suitability.—Most of the acreage is in crops. A large part is in forest. The rest is in pasture and idle areas. Management is similar to that of the associated Chester, Myersville, and Dyke soils. Crop yields are about the same as those of Myersville silt loam, undulating phase. Common 4- to 6-year rotations are corn, small grain, and mixed hay crops. Some orchardgrass is grown for seed. Alfalfa is grown successfully on a few acres.

Unison silt loam, undulating phase, is probably best suited to corn and hay crops. Moist conditions make it less suitable for small grain and vegetables. Alfalfa does not do as well as on the better drained Dyke, Myersville, and Chester soils. Small grain lodges where organic matter is high. Fertilizers that contain chiefly phosphate and potash and light applications of lime are needed. Corn and grass on some areas may need light applications of nitrogen if nitrogen is not supplied by legumes and manure.

Unison silt loam, rolling phase (Ub) (Capability unit IIIe–8).—This soil occurs in association with Unison silt loam, undulating phase. It differs mainly in having stronger slopes and a shallower profile. Runoff is medium to rapid, and internal drainage is medium to slow. In places the underlying original land surface is exposed through the colluvial beds. The soil is more erodible and has a slightly lower capacity to hold water that plants can use than the undulating phase.

Use and suitability.—This soil is mostly in crops and pasture. A small part is in forest and idle areas. Crops similar to those grown on Unison silt loam, undulating phase, are suitable for this soil. Practices are needed, however, to keep the soil productive. These include longer rotations that contain more sod crops, contour cultivation, and the use of more manure and crop residues. Small grain and hay crops are more suitable for this soil than corn and other row crops.

Unison stony silt loam, undulating phase (Uc) (Capability unit IIIe–8).—This soil is similar to Unison silt loam, undulating phase, in most characteristics but contains loose greenstone and quartz cobbles and stones that impede cultivation. Most of the stones are less than 8 inches in diameter, although some are as much as 12 inches. The stones occupy 5 to 20 percent of the surface. The proportion in the profile varies. Most of the stones can be removed from the surface. Runoff and internal drainage are medium to moderately slow. There are a few wet and very stony spots in places. This soil is intricately associated with Unison silt loam, undulating phase. Areas are in the Dyke-Unison-Elbert soil association.

Use and suitability.—Most of this soil is in crops and pasture. Some is in trees and some is idle. Most of the native pasture vegetation is bluegrass, white clover, broomsedge, orchardgrass, lespedeza, hop clover, sheep sorrel, hawkweed, blackberries, and dewberries.

Mainly because of stoniness, this soil has been cultivated less than Unison silt loam, undulating phase, and generally contains slightly more organic matter. It is, however, fairly well suited to cultivated crops.

Unison stony silt loam, rolling phase (Ud) (Capability unit IVs–3).—This soil has stronger slopes and is shallower than the associated Unison stony silt loam, undulating phase. Nearly all areas have slopes of 7 to 14 percent. In a small acreage, the slopes are 14 to 25 percent. Runoff is medium to rapid, and internal drainage is medium.

Use and suitability.—Most of the acreage of this soil is in pasture. A considerable part is cultivated, and the rest is mostly in forest trees and idle areas. Strong slopes and stoniness make this soil difficult to work and conserve and limit its use. Most areas are best suited to pasture unless stones and cobbles are removed. On some farms the hilly, more stony areas are best suited to forest. Pastures need phosphate and potash fertilizers and lime.

Very rocky land

Very rocky land, acidic rock phase (Rg) (Capability unit VIIs–2).—This land type occupies rolling, hilly, and steep uplands. It ranges from a thin film to 5 feet in depth but averages about 3 feet. Acidic rock outcrops, loose stones, and boulders compose 40 to 90 percent of the mass of this land type. The soils among the rocks and stones resemble Buckingham, Brandywine, Manor, Eubanks, Chester, and Hazel soils. The larger areas are associated with Buckingham and Brandywine soils along the Blue Ridge and Short Hill and along deeply dissected areas near streams. Runoff is very rapid, and internal drainage is slow to very rapid. Very steep slopes occur on areas of this land type along river bluffs.

Use and suitability.—Nearly all this land type is in forest. Some of the smoother areas are in pasture, brush, and idle acreage. The best use is for woodland. The woodland consists mainly of dry-site trees such as chestnut oak, red oak, black oak, white oak, hickory, blackgum, sassafras, red maple, dogwood, and scarlet oak. There is some Virginia pine.

Very rocky land, basic rock phase (Rh) (Capability unit VIIs–2).—This miscellaneous land type occurs on undulating, rolling, hilly, and steep uplands. From 40 to 90 percent is basic rock outcrops, loose stones, and boulders. The depth ranges from a thin film to 4 feet but averages about 1½ feet. Shallow soils similar to the Catoctin, Legore, Montalto, Iredell, Mecklenburg, Fauquier, and Myersville soils occur among the rock outcrops, stones, and boulders. Most areas are along slopes of the Blue Ridge and in the Triassic Lowland.

This land type has medium to very rapid runoff and slow to medium internal drainage. It has a very low to low capacity to hold water that plants can use and low to medium fertility. It is slightly to very strongly acid. Cultivation is possible only in small patches among the rocks and stones.

Use and suitability.—Practically all of this land type is in trees. A few areas are in permanent pasture and idle acreage. Tree growth is generally sparse and much slower than on the nonstony soils. The trees are chiefly oak, hickory, gum, locust, and walnut. Because of its rockiness, this land type is suitable only for woodlands, recreational grounds, and wildlife habitats.

Wehadkee series

The Wehadkee series consists of flat, poorly drained, light-colored soils on low first bottoms. These soils have a dominantly brown silt loam surface soil, which is mottled with yellowish brown, grayish brown, light brown, and gray. The subsoil is silty clay loam to silty clay mottled with yellowish brown, gray, and white. The parent material is silty, sandy, and gravelly strata of alluvium washed from the Piedmont Upland. The entire profile contains many small shiny mica flakes. Only one soil of the Wehadkee series is mapped in the county.

Wehadkee silt loam (Wa) (Capability unit Vw–1).—This wet soil occupies level or slightly depressed bottom lands along larger streams. It has developed from alluvium washed from uplands underlain mostly by crystalline rocks. Runoff is very slow, and internal drainage is

very slow to slow. This soil resembles Melvin silt loam of the bottom lands and Worsham silt loam of the colluvial lands in drainage, relief, and profile color but has different parent material. It is subject to frequent flooding. The soil is associated with the well-drained Congaree soils and the somewhat poorly drained Chewacla silt loam of the bottom lands.

Profile in a pastured area:

Surface soil—
0 to 10 inches, dominantly brown, friable silt loam faintly mottled with yellowish brown, grayish brown, light brown, and gray; moderate, fine, granular structure.
Subsoil—
10 to 32 inches, slightly plastic silty clay or silty clay loam mottled with yellowish brown, gray, and white; weak, medium, subangular blocky structure; some small mica flakes.
Underlying material—
32 to 40 inches, dominantly gray, friable, slightly plastic light silty clay loam to silt loam soil material mottled with yellowish brown and white; many mica flakes and some very fine sandy loam pockets.
40 inches +, silty, sandy, and gravelly stratified alluvium.

The surface soil ranges from very fine sandy loam to heavy silt loam in texture and from 6 to 14 inches in thickness. It is brown or grayish brown where alluvial material has been recently deposited. The subsoil ranges from fine sandy clay loam to silty clay in texture but is silty clay loam in most places. The thickness of the subsoil ranges from 12 to 48 inches. In some places the soil receives runoff and gravel from adjoining upland slopes. In other places it contains ponded areas.

Wehadkee silt loam is medium to strongly acid. It has a low to moderate amount of organic matter and is medium to high in fertility. Permeability to roots, water, and air is restricted by the high water table in the soil.

Use and suitability.—This soil is mostly in pasture and idle areas. A small part is in trees. Because it is poorly drained, this soil is very difficult to work and not well suited to cultivated crops. Heavy farm machinery cannot be moved over the land. Few crops except permanent pasture are grown successfully, and yields are low.

Management for crops and pasture has been generally poor. Most areas have not been fertilized, ditched, or otherwise properly managed. Permanent pasture is the most suitable use for this soil. Some good pasture practices are (1) the selection of suitable grasses, (2) moderate applications of complete fertilizers that are high in phosphate and potash, (3) ditching or bedding of the wetter areas, (4) grazing control, and (5) clipping the undesirable herbage where possible.

Whiteford series

The Whiteford series consists of well-drained, moderately deep soils that are mainly on undulating and rolling relief. These soils have a brown silt loam surface soil over mottled heavy silty clay loam subsoil. They have developed from weathered products of phyllitic slate. The Whiteford soils resemble the Myersville and Glenelg soils in color, thickness, and relief but have developed from different parent material. They are less fertile than the Myersville soils but are suited to a wide variety of crops. They are not as micaceous as the Glenelg soils and are shallower over bedrock.

Whiteford silt loam, undulating phase (Wb) (Capability unit IIe–2).—This soil occupies medium high, narrow ridgetops in the northwestern part of the county near the foot of the Blue Ridge Mountains. Runoff and internal drainage are medium. This soil is associated with the Hazel soils. Areas are in the Hazel-Whiteford-Worsham soil association.

Profile in a cultivated area:

Surface soil—
0 to 6 inches, yellowish-brown to brown, very friable silt loam; weak, medium, subangular blocky structure that crushes easily to moderate, medium, granular structure; a few flat slate fragments on the surface in places.
Subsoil—
6 to 12 inches, yellowish-red, friable to firm, heavy silt loam or light silty clay loam; moderate, fine to medium, subangular blocky structure.
12 to 20 inches, yellowish-red, strong-brown, and yellowish-brown, firm, heavy silty clay loam; moderate, medium, subangular blocky structure; a few phyllitic slate and quartz fragments.
Parent material—
20 to 32 inches, weathered phyllitic slate and schist mottled with strong brown, yellowish red, gray, and dark gray; mixed with light silty clay to silt loam soil material of similar colors; many pieces of quartz gravel; some basic rock material in narrow strata in places.

The texture of the subsoil is silty clay loam in most places, but it is silty clay, clay loam, and clay in a few places. Strata and stringers of chloritic greenstone and arkosic sandstone materials are in the parent rock in a few areas. A few bedrock outcrops occur locally.

This soil is strongly to very strongly acid. It has a low to moderate amount of organic matter and is low to medium in fertility. Permeability is moderately rapid in the surface soil and moderate in the subsoil. The soil has a moderate capacity to hold water that plants can use. It is easy to work and conserve.

Use and suitability.—This soil is chiefly in crops and pasture. Small parts are in forest and idle areas. Corn, small grain, and mixed hay are commonly grown in 4- to 6-year rotations. Most yields are less than those of Myersville silt loam, undulating phase, and Chester loam, undulating phase, which are in the same capability unit.

This soil is well suited to most local crops. Slopes and other characteristics are favorable for good production, but fertility must be kept at a high level. Present rotations should include more legumes. If nitrogen is supplied by manure and legumes (every 3 or 4 years in the rotation), the major needs are lime, phosphate, and potash. If manure and legumes are not used, nitrogen may be needed on some areas, especially for corn, small grain, and grass. This soil requires contour cultivation. Stripcropping, however, is not needed except where the soil occurs in small areas with steeper soils.

Whiteford silt loam, rolling phase (Wc) (Capability unit IIIe–2).—This soil has stronger slopes and a shallower profile than Whiteford silt loam, undulating phase. It occurs on rolling ridgetops and on slopes leading from ridge crests. Runoff is medium to rapid, and internal drainage is medium. This phase is more erodible than Whiteford silt loam, undulating phase, and it has lost much surface soil. A few deep gullies have formed. The soil is associated with Whiteford silt loam, undulating phase, and with the Hazel soils.

Use and suitability.—Most of the acreage of this soil is in crops and pasture. Some is in forest and some in orchards. The rest is in brush and idle areas. Manage-

ment practices are similar to those for Whiteford silt loam, undulating phase, but crop yields are smaller.

This soil requires more careful management than Whiteford silt loam, undulating phase, mainly because of stronger slopes, more rapid runoff, and greater erosion hazard. Good practices are the use of more sod crops, longer rotations, more manure and crop residues, and contour cultivation. Stripcropping can be used on some areas to advantage.

Whiteford silt loam, hilly shallow phase (Wd) (Capability unit VIe–1).—This soil occurs on hilly upland ridges and ridge slopes and has a shallower profile than Whiteford silt loam, undulating phase. Runoff is rapid to very rapid, and internal drainage is medium. The hazard of erosion is high to very high. A few deep gullies have formed in some areas. This soil is difficult to work and has limited use. Small areas of Hazel soils are included.

Use and suitability.—Most of this soil is in pasture and forest. The rest is in crops, brush, and idle areas. This soil is best used for pasture or forest because of the hilly slopes and erosion hazard. Lime, complete fertilizers that contain mainly phosphate and potash, grazing control, selection of suitable pasture grass, and some seeding are needed to establish and maintain good pasture.

Whiteford stony silt loam, rolling phase (We) (Capability unit VIs–2).—This stony soil has stronger slopes than Whiteford silt loam, undulating phase. Flagstones of phyllitic slate cover from 5 to 20 percent of the surface of this soil; some occur in the subsoil. These flagstones are 3 to 15 inches long and are numerous enough to make cultivation impracticable. They are mixed with quartzite gravel and stone in places. Some outcrops of bedrock occur locally. Runoff is medium to moderately rapid, and internal drainage is mostly medium. Some deep gullies have formed in a few areas.

Use and suitability.—Most of this soil is in pasture and forest. It is best suited to these uses because of its stoniness and rolling slopes. Pastures need grazing control, clipping of undesirable herbage, and some reseeding. Lime and complete fertilizers that contain mostly potash and phosphate are major needs. The soil also needs more moisture.

Whiteford stony silt loam, hilly phase (Wf) (Capability unit VIs–2).—This stony soil occupies the sides of upland ridges and has stronger slopes than Whiteford silt loam, undulating phase. Runoff is rapid to very rapid, and internal drainage is medium. The hazard of erosion is high to very high, and much surface soil has eroded. A few deep gullies have formed in some areas. This soil is associated with other Whiteford soils.

Use and suitability.—Most of the acreage of this soil is in forest. The rest is in permanent pasture and idle areas. Because of stoniness and hilly slopes, this soil is best used for pasture and forest. Intensive use of the same practices as given for Whiteford stony silt loam, rolling phase, should give good results. Grazing control is a major management need.

Wickham series

The Wickham series consists of brown, well-drained soils that have developed from materials washed mostly from the Piedmont Upland. These soils have a thick, brown loam to silt loam surface soil. The subsoil is a yellowish-brown to reddish-brown clay loam. The parent material is alluvium from igneous and metamorphosed igneous rocks. Only one soil of the Wickham series is mapped in the county.

Wickham loam (Wg) (Capability unit IIe–2).—This deep to very deep, brown soil is known locally as brown chocolate land. It occupies low stream terraces in very small, widely separated areas, mainly along Goose Creek and the Little River. It has developed from moderately recent alluvium, a mixture of sand, silt, and clay derived from upland soils. Most slopes are about 3 percent, but a few are 7 percent or a little more. Runoff and internal drainage are medium. Areas of Wickham loam are in the Chewacla-Congaree-Wehadkee and Hiwassee-Masada soil associations.

Profile in a cultivated area:

Surface soil—
0 to 10 inches, brown to dark-brown, very friable loam; weak, fine, granular structure.
Subsoil—
10 to 28 inches, yellowish-brown to reddish-brown, friable clay loam (slightly sticky when wet); moderate, medium, subangular blocky structure.
Underlying material—
28 to 50 inches, mingled red, yellowish-red, and strong-brown loam to sandy clay loam soil material mixed with river gravel and fragments of gneiss and granodiorite; some mica flakes and stratified alluvial materials in the lower part.

A few areas on slightly high positions, which resemble Hiwassee loam, light surface phase, are included with this soil.

Wickham loam is medium to strongly acid. It has a moderate to high amount of organic matter and medium to high fertility. Permeability is rapid in the surface soil and moderate in the subsoil. The soil has a high capacity to hold water that plants can use. It is easy to work and conserve. The hazard of erosion is slight.

Use and suitability.—Most of this soil is cultivated. The management practices are similar to those for the associated upland soils. This soil is well suited to local crops because of favorable slopes, good supply of organic matter, natural fertility, permeability, depth, and high capacity to hold water that plants can use. Yields are high under simple management. Practices similar to those for the undulating phases of Chester and Eubanks soils should give good results on this soil.

Worsham series

The Worsham series consists of poorly drained, gray soils located on flat depressions and along the upper reaches of drainageways. The surface soil is dominantly dark grayish brown mottled with gray. The subsoil is firm to friable silty clay loam, clay loam, or fine sandy clay loam, prominently mottled with strong brown, yellowish red, yellow, and gray. The underlying material, which is extremely variable, is composed of dominantly gray sandy loam to light silty clay loam mottled with light olive, strong brown, white, and yellow. It contains many small, angular pieces of quartz and schist, as well as granodiorite fragments. The Worsham series is associated with the Chester, Belvoir, Brandywine, Eubanks, Glenelg, Manor, and Elioak soils. Only one soil of the Worsham series is mapped in the county.

Worsham silt loam (Wh) (Capability unit IVw–1).—This wet, poorly drained soil, commonly called gray craw-

fish land, occupies flat depressions among soils of the colluvial lands. It has developed mostly from fine local colluvial, and some alluvial, materials washed from the associated soils. A few areas have developed from residual products of acidic rocks on the broader upland flats. Runoff is very slow to slow, and internal drainage is very slow. This soil resembles Croton silt loam, level phase, of the Triassic Lowland in drainage, relief, and position, but it was derived from different parent material. Worsham silt loam is associated with Chester, Brandywine, Eubanks, Belvoir, Elioak, Glenelg, Manor, and Meadowville soils of the Piedmont Upland area.

Profile in a cultivated area:

Surface soil—
0 to 6 inches, dominantly dark grayish-brown, mottled with gray and light gray, very friable silt loam; strong, medium, granular structure.
6 to 15 inches, mottled yellowish-brown, yellowish-red, and gray friable silt loam; strong, medium, granular structure.
Subsoil—
15 to 20 inches, firm, gritty silty clay loam prominently mottled with strong brown, yellowish red, yellow, and gray; moderate, medium, subangular blocky structure.
20 to 35 inches, dominantly gray, plastic, gritty clay loam mottled with strong brown and yellow; moderate, coarse, blocky structure to massive.
35 to 50 inches, light-gray, slightly plastic silty clay loam mottled with light olive; moderate, subangular blocky structure; many small pieces of quartz gravel in the lower part of the layer.
Underlying material—
50 inches +, light-gray, friable silt loam to light silty clay loam soil material mottled with light olive and strong brown; mixed with many quartz and granodiorite fragments.

The surface soil ranges in texture from sandy loam to light silty clay loam but is mostly silt loam and loam. (In a large included acreage the surface soil is gravelly silt loam.) The texture and sequence of the subsoil layers vary considerably and change abruptly with distinct changes in the parent colluvial and alluvial materials. The subsoil texture ranges from fine sandy clay to clay, but clay loam and silty clay loam are most common. More subsoil layers are generally present in those areas of the soil that have developed chiefly from colluvial material. Small areas are somewhat poorly drained and have a brown surface soil and more brown and yellow than gray mottles in the subsoil.

Worsham silt loam is medium to very strongly acid. It has a low to moderate amount of organic matter and is medium to high in fertility. Permeability is moderately rapid to rapid in the surface soil and slow to moderate in the subsoil. A high water table prevents the entrance of roots, water, and air. The soil has a moderate capacity to hold water that plants can use. It is hard to work but fairly easy to conserve.

Use and suitability.—This soil is mostly in pasture, but a large part is idle. Small parts are in crops and woodland. This soil is best suited to permanent pasture. It is well suited to ladino clover and fescue, but reseeding every 3 to 4 years is difficult unless the soil is drained.

Good pasture practices are the liberal use of phosphate and potash fertilizers, liming, seeding of grass mixtures, grazing control, clipping of undesirable herbage, and some ditching of wet areas. Cattle should not be allowed to trample the pasture during wet periods.

Genesis, Morphology, and Classification of Soils

Soil is the product of the forces of weathering and soil development (*9*) acting on the parent soil materials deposited or accumulated by geologic agencies. The characteristics of the soil at any given point depend on (1) the physical and mineralogical composition of the parent material, (2) the climate under which the soil material has accumulated and existed since accumulation, (3) the plant and animal life in and on the soil, (4) the relief, or lay of the land, and (5) the length of time the forces of soil development have acted on the soil material.

Of the five factors of soil formation, climate, vegetation, and animal life are the active forces that gradually form a soil from parent material. Relief is a conditioning factor that, in most places, largely controls natural drainage. Therefore, relief influences the effectiveness of climate, vegetation, and animal life. If climate, vegetation, and animal life have not operated long enough to produce a soil in near equilibrium with its environment, the soil is considered young or immature. In this regard, age is an important factor. Well-drained alluvial and recent colluvial soils, for example, are considered very young in their development, or so young that climate and vegetation have not had sufficient time to produce any apparent morphological results.

Factors of Soil Formation in Loudoun County

Parent materials

The parent materials of the soils of Loudoun County are in two broad classes, based on the source of the material: (1) Materials residual from the weathering of rocks in place and (2) transported material, or material removed from its original position and deposited on uplands and along streams. The first class consists of the residuum from the weathering of the underlying rocks. The second class includes soil and rock materials that were moved by gravity or water, or by both, from uplands and deposited in upland depressions and on foot slopes. It also includes alluvial material washed from uplands and deposited near streams by running water.

Rocks of the pre-Cambrian, Ordovician, and Triassic geologic periods (*2*), listed in the order of the oldest to the youngest, underlie the county. These include igneous, metamorphic, and metasedimentary types. Weathering of these rocks has provided a variety of parent materials for soils of the uplands.

Climate

The climate of Loudoun County is of the humid, continental type. The average annual precipitation is 38.77 inches, the average summer temperature is 74.5° F., and the average winter temperature is 34.2°. Rainfall is well distributed throughout the year; it is slightly greater in spring and summer than in fall and winter. Any differences in temperature are small, though there may be some change with elevation above sea level. Thus, the climate is practically uniform over the entire county. The differences in soils, therefore, cannot be attributed to differences in climate.

Under the prevailing climate, the normal soils are highly leached, are low in organic matter, and have well-developed podzolic features. Severe leaching causes the plant-nutrient supply in the surface soil to be less than in the subsoil, and it has prevented the accumulation of free calcium carbonate in the soil. However, calcium is present in some of the underlying rocks.

Operating alone, the forces of climate directly affect the weathering of the underlying rocks. However, they can only produce the parent materials from which the soils develop. Without living organisms (vegetation and animal life), soil materials would not have many of the more important characteristics of soil but would be merely residual or transported products of rock weathering. Some, however, might have definite layers produced by differential weathering, leaching, eluviation, and illuviation. Thus, the forces of climate, by means of percolating water, cause the eluviation of soluble and colloidal materials. Through the action of vegetation and animal life, the processes become constructional. A reversible cycle between intake and outgo of plant nutrients is established. As a result the surface soil becomes renewed to various degrees by nutrients from the lower part of the profile.

Plant and Animal Life

Of the living organisms influencing soil development, micro-organisms and plants are of primary importance. Bacteria and fungi decompose raw plant waste into organic matter for the soil. They also bring plant nutrients from the lower part of the profile to the upper part. The general type of vegetation is controlled by climate to a great extent. In this way, climate exerts a powerful indirect effect on soil development. A well-developed soil is largely the result of the effects of climate and living organisms on the parent material. Throughout the United States, wherever vegetation varies significantly the general type of soil varies accordingly.

The native vegetation of Loudoun County was a mixed forest, mainly of deciduous trees. Some coniferous trees occur. There is no great difference in species on the various soils. The main species are oak, hickory, yellow-poplar, and pine.

During soil formation, some organic matter from the forest became incorporated with the soil. In the present upland wooded areas, which have never been cleared for agriculture, thin layers of forest litter and leaf mold cover the soil. A small quantity of organic matter from decayed leaves and twigs is mixed through the first inch or two of the surface soil. In places, on such soils as the Meadowville and Worsham series along small drainageways and in depressions, a slightly larger quantity of organic matter has accumulated on the surface. In some first bottoms, a moderately large amount of well-decomposed organic matter is thoroughly incorporated throughout the soil. Since vegetation is fairly uniform throughout the county, soil differences cannot be attributed to differences in vegetation. Although some fairly minor variations in the vegetation are associated with different soils, these variations are probably the result of and not the cause of the differences in soils. Possibly, a reciprocal relationship once existed.

Relief

Relief, or lay of the land, varies much from place to place in Loudoun County. Apparently, this factor has influenced greatly the development of the differences among soils. Relief affects soil formation through its influence on internal drainage, runoff, and other water effects, including normal, or geologic, erosion. It is significant that (1) the well-developed soils in the county that have a red B horizon are associated with undulating or rolling areas in which drainage is good; (2) the soils with little or no subsoil development are associated largely with hilly to steep relief and excessive drainage; (3) the soils having a yellow B horizon are associated principally with nearly level or gently undulating areas where drainage is somewhat retarded; and (4) the soils with a mottled gray and yellow B horizon are associated with flat or depressed areas where the drainage is poor. Relief (*9*), therefore, serves as a modifying factor in soil formation. Because of this factor, several different soils may develop from identical parent material.

Age

Differences in age account for differences among some of the soils. Age, or time, was necessary for the development of distinct profiles. The parent material of some soils is older and has remained in place longer than that of others. Generally, the longer the parent material has remained in place, the greater are the effects of climate and vegetation in soil development, and the greater is the degree of profile differentiation. In soil genesis, age refers to the degree of development of the soil profile rather than to the actual length of time that the soil has undergone formation and development. Soils are classified as being either mature or immature. Mature soils are those that, regardless of drainage conditions, have well-developed profile characteristics, including a full development of the A and B horizons. Such soils (*9*) have been produced by the natural processes of soil formation and are in equilibrium with their environment. A mature soil will show well-defined genetic soil horizons, whereas an immature one will show little or no genetic horizonation.

Some soils have required a longer time to reach maturity than others. This is true even though they may have started their formation and development simultaneously. Although the age mainly determines the maturity of a soil, relief and character of parent material greatly influence it. For example, the shallow A-C soils (soils without a B horizon) of hilly and steep relief are young or immature because natural erosion on this relief removes soil material almost as fast as it accumulates. The soils of well-drained first bottoms and well-drained recent colluvial lands are immature because their parent material is young, and new material is added by periodic deposition. In places the parent rocks of some soils (*9*) are so resistant to weathering that mature profiles do not develop even under ideal conditions of relief.

In Loudoun County the moderately high rainfall and temperature, dominantly favorable relief, and somewhat uniform conditions or rock weathering have brought about fairly rapid soil maturity. All of the soils, except the shallow soils of uplands and those of the well-drained bottom lands and recent colluvial lands, may be considered mature or nearly mature.

Classification of Soils

Soils are grouped into progressively broader classes on the basis of shared characteristics. The soil types recognized in the fieldwork of soil surveys are grouped into soil series. These in turn are grouped into classes called great soil groups, which are then combined into orders. All soils of the world are placed in three orders, which are called zonal, intrazonal, and azonal. Each of these orders contains several great soil groups. The classification of the soils in Loudoun County by great soil groups and orders is discussed in this section.

Zonal soils

Zonal soils are those that have well-developed characteristics that reflect the influence of climate and living organisms, chiefly vegetation, upon well-drained but not excessively drained parent material over a long time. Zonal soils are considered normal because they show complete development of the A and B horizons and are in equilibrium with their environment.

In Loudoun County, many of the soils on undulating and rolling uplands and terraces have well-drained, well-developed profiles. They also have other characteristics common to soils of similar relief throughout the general area of similar climate and vegetation. Because of the favorable relief and parent material of these soils, climate and vegetation have had the maximum effects on their formation. They have lain in place long enough to reach the normal stage of maturity and are, therefore, the zonal soils of the county.

The zonal, or normal soils, in the virgin areas have light-colored and light-textured surface layers, or A horizons, that overlie thicker, heavier textured, and darker colored subsoil layers, or B horizons.

The B horizons, in turn, overlie the parent material layers, or C horizons, which range considerably in texture but are usually lighter textured than the B horizons and heavier textured than the A horizons. The C horizons of the residual soils vary in thickness, depending largely on the resistance to weathering of the bedrock.

The texture of the A, B, and C horizons differs among the various zonal soils and is largely influenced by the texture and mineral composition of the underlying parent rock.

In the A horizons, the texture is mainly silt loam, fine sandy loam, loam, and sandy loam on uneroded soils and silty clay loam or clay loam on eroded soils. Rock fragments modify the texture of the surface of some of the soils.

In the B horizons, the texture is mainly silty clay loam, silty clay, clay, sandy clay, and fine sandy clay. The materials of the C horizon are variable, depending on the degree and depth of weathering and character of the parent rock. They may be gravelly sandy loam, coarse sandy loam, sandy loam, fine sandy clay loam, sandy clay loam, or light clay, or silty clay loam intermixed in places with rock fragments in various stages of decomposition.

The thickness of all the horizons differs somewhat among the different soils, as the parent rocks differ in age and resistance to weathering.

The zonal soils in Loudoun County are members of the Red-Yellow Podzolic, the Gray-Brown Podzolic, and the Reddish-Brown Lateritic great soil groups.

RED-YELLOW PODZOLIC SOILS

Red-Yellow Podzolic soils (*6*) comprise a group of well-developed, well-drained acid soils having thin organic (A_0) and organic-mineral (A_1) horizons over a light-colored, bleached (A_2) horizon, over a red, yellowish-red, or yellow more clayey (B) horizon. Parent materials are all more or less siliceous. Coarse reticulate streaks or mottles of red, yellow, brown, and light gray are characteristic of deep horizons in Red-Yellow Podzolic soils where parent materials are thick.

Red-Yellow Podzolic soils are developed under deciduous, coniferous, or mixed forest in a warm to warm-temperate humid climate. Under such conditions the decomposition of organic matter and the leaching of plant nutrients are rapid. Consequently, the soils are strongly to extremely acid in reaction. They are also very low in bases, such as calcium and magnesium and in phosphorous. The clay fraction is dominated by kaolinite, as a rule. It commonly contains moderate to large quantities of free iron oxides or hydroxides and may contain small amounts of alumina. One or both of hydrous micas and montmorillonite may form part of the clay fraction in some of the soils.

Differences in morphology among Red-Yellow Podzolic soils in the county are associated with nature of parent materials and with past use. On the whole, the reticulate streaks in the deeper profiles of many of the soils are nearer the top of yellow than red B horizons. A few of the soils, especially the very sandy ones, lack reticulate streaks. In cultivated areas the A_0 and A_1 horizons have been mixed so that they are no longer distinguishable. Where accelerated erosion has occurred, much or all of the A horizon may have been removed to expose the B horizon.

Red-Yellow Podzolic soils are mostly undulating to rolling and have the best drainage conditions among the soils of the uplands. For the most part, they occupy ridgetops. Certain other great soil groups, i.e., the Reddish-Brown Lateritic soils and Gray-Brown Podzolic soils, occupy comparable topography and have similar drainage conditions.

Red-Yellow Podzolic soils were once classified into separate great soil groups known as Red Podzolic soils and Yellow Podzolic soils (*9*). Earlier they had simply been called Red and Yellow soils (*4*). In these earlier systems of classification, the soils of the Reddish-Brown Lateritic group were considered Red Podzolic soils at one period and among the Red and Yellow soils prior to that.

Loudoun County lies in a transition between a belt to the north in which Gray-Brown Podzolic soils are the principal zonal group and a belt to the south in which Red-Yellow Podzolic soils are dominant. Perhaps, because of the location of the county in this transitional zone, the soils are less strongly weathered and leached than Red-Yellow Podzolic soils to the south.

In Loudoun County, the following series are classified as Red-Yellow Podzolic soils: Elioak, Eubanks, Mecklenburg, Braddock, Thurmont, Masada, Wickham, Hiwassee, Brecknock, Whiteford, Clifton, Belvoir, Calverton, Captina, and Sequatchie.

Seven of these soil series are intergrades to other groups. The Clifton soils are intergrades to the Reddish-Brown Lateritic great soil group. The Belvoir, Calverton, and Captina soils are intergrades to Planosols. Wickham, Whiteford, and Sequatchie soils are intergrades to the Gray-Brown Podzolic great soil group.

A representative profile is given for the 10 soil series which are not intergrades. Representative profiles are also given for the three series that are intergrades to Reddish-Brown Lateritic and the three that are intergrades to Planosols.

Elioak series.—The fairly extensive soils of the Elioak series are representative of the Red-Yellow Podzolic group. They have formed from quartz sericite schist and are closely associated with the Glenelg, Manor, Meadowville, and Worsham soils. They occur on tops and sides of low ridges where drainage is good and relief is mostly undulating. Locally, small quartz and stone fragments are on the surface and in the upper soil layers. In places, erosion has removed part of the A horizon and exposed the red subsoil.

Elioak silt loam, undulating phase, on a 5 percent slope in a pasture, 1½ miles east of Hamilton along Highway No. 7, has the following profile:

- A_p 0 to 7 inches, yellowish-brown (10YR 5/4) to dark-brown (7.5YR 4/4), very friable silt loam; weak, fine to moderate, medium granular structure; many small mica flakes; few small quartz and schist fragments.
- B_1 7 to 13 inches, yellowish-red (5YR 5/8), friable, slick, heavy silt loam; weak, fine to medium, subangular blocky structure; numerous small mica flakes; few small quartz and schist fragments; small root and insect holes are plentiful.
- B_2 13 to 26 inches, red (2.5YR 4/8), friable, slick, silty clay loam; moderate, medium to coarse, subangular blocky structure; crushes easily to strong, fine, subangular blocky structure; few black films on coating of soil aggregates; numerous small mica flakes and soft schist fragments in lower part.
- B_3 26 to 35 inches, red (2.5YR 4/8), friable silt loam; weak, fine, platy to weak, fine to medium, subangular blocky structure; contains numerous small mica flakes, small pieces of schist, and some pieces of quartz gravel that increase in lower part.
- C_1 35 to 68 inches, dominantly brownish-yellow (10YR 6/8) and weak-red, soft, partially decomposed micaceous schist materials with very weak, platy structure similar to rock structure; crushes easily and is 90 percent very fine mica flakes.
- C_2 68 inches +, dominantly brownish-yellow (10YR 6/8) and weak-red, soft, weathered schist rock materials; materials are harder and not as highly decomposed as in C_1 horizon; numerous mica flakes and a few quartz fragments.

The soil is strongly acid throughout. Grass roots are plentiful in A_p, B_1, and B_2 horizons. The A_2 is generally a yellowish-brown in wooded areas.

Eubanks series.—The soils of the Eubanks series resemble those of the Elioak. However, they have developed from granodiorite rock materials and have coarser textures throughout. They are associated with the Chester, Montalto, Brandywine, Belvoir, and Worsham soils. The A horizon is mostly brown, very friable to loose loam, fine sandy loam, and coarse sandy loam. In most places, the upper part of the B horizon, or the transitional layer, is yellowish-red or reddish-yellow fine sandy clay loam or heavy loam. The main part of the B horizon is red, friable to slightly firm fine sandy clay loam and clay loam. The parent materials are mingled red, yellowish-red, reddish-yellow, white, strong-brown, and light olive-brown, very friable to friable coarse sandy loam mixed with many pieces of quartz gravel and granodiorite rock fragments. The Eubanks soils are mapped as part of the Eubanks-Chester complex. They are transitional between the Chester and Montalto soils in most characteristics.

Mecklenburg series.—Soils of the Mecklenburg series are mapped in this county only as members of a complex with Iredell soils. The solum is redder, thicker, and better drained than that of the Iredell soils, and the Mecklenburg soils do not have a claypan as do the Iredell. The Mecklenburg soils are transitional between the Iredell, Montalto, and Davidson series. The Davidson, not mapped in Loudoun County, is a typical Reddish-Brown Lateritic soil.

Braddock series.—Soils of the Braddock series have formed over old colluvial beds of mixed greenstone, schist, and quartzite along mountain foot slopes. They resemble the Eubanks and Elioak soils. They are well drained and occupy some of the higher elevations among areas of the associated Thurmont and Trego soils. Their well-developed profile has a brown to yellowish-brown silt loam to loam A horizon, a yellowish-red upper B horizon, and a red, heavy subsoil that grades with depth from silty clay loam to silty clay. The C layer is mottled red, yellow, and brown friable silty clay loam. Quartz gravel, cobbles, and some stones generally occur throughout the profile but are mainly in the surface soil and parent material. Gravel, cobbles, and loose stones are characteristic.

Thurmont series.—The Thurmont soils occupy positions and have characteristics between those of the associated Braddock and Trego soils. They have a yellowish-brown to brown loam to silt loam A horizon and a strong-brown to yellowish-red silty clay loam B horizon. The parent materials are old colluvial beds. These beds are made up of many subangular and angular pieces of quartz gravel and cobbles, mixed with many greenstone and mica schist fragments and multicolored silty clay loam soil materials.

Thurmont soils resemble the Jefferson soils (not mapped in the county). However, the Thurmont soils are finer textured and less acid, and they have more basic colluvium. Gravel, cobbles, and loose stones are characteristic.

Masada series.—The soils of the Masada series are associated with the Hiwassee soils on the old high stream terraces. They are lighter colored and coarser textured throughout their depth, and they are mostly on nearly level to very gently sloping relief. Runoff and internal drainage are slightly slower than on the Hiwassee soils. The Masada soils have a grayish-brown to yellowish-brown A horizon and a yellowish-brown to yellowish-red B horizon. The C horizon consists of friable fine sandy clay to sandy loam mottled with light gray, yellowish red, red, and brownish yellow. It is mixed with many cobbles and some partly weathered sandstone, schist, shale, and quartzite fragments.

Wickham series.—The soils of the Wickham series are on low stream terraces. The parent material, like that of the Masada soils, is from crystalline rocks that yielded some mica. The profile of the Wickham soils is not so well developed as that of the Masada, and gravel is less common. The B layer is brown to reddish brown, in contrast to the yellowish-red B layer of the Masada

series. The Wickham soils have about the same degree of development as the Elk soils but differ in the origin of their parent material and the color of their B layer. In the Elk soils, the parent alluvium originated from limestone and shale and the B layer is yellowish brown. Both the Wickham and Elk soils lack maturity, but they are better developed than the Sequatchie soils.

The Wickham series comprises Red-Yellow Podzolic soils considered intergrades to the Gray-Brown Podzolic group because they have browner A horizons and less distinct A_2 horizons, and they are less strongly leached than typical.

Hiwassee series.—The soils of the Hiwassee series in Loudoun County are light surface variants and are typical Red-Yellow Podzolic soils. The normal Hiwassee soils, however, are of the Reddish-Brown Lateritic great soil group. Defined according to great soil group, the light surface variants of the Hiwassee soils have horizons similar to those of the Elioak and Eubanks soils. The Hiwassee variants are on high stream terraces. Their parent material originated chiefly in basic and acidic granite, gneiss, schist, and related rock. These soils have a coarser texture than the Elioak but are somewhat firmer than the Eubanks soils.

Brecknock series.—The soils of the Brecknock series, which occur on undulating and rolling relief, have formed from the weathered products of baked shale and sandstone. The color of the solum is affected by the grayish colors of the baked parent materials. The A horizon is brown to grayish-brown and yellowish-brown silt loam to loam. The upper B horizon is yellowish-brown silty clay. The main part of the B horizon is yellowish-brown, mingled with strong-brown, light-gray, and white, silty clay loam, silty clay, and clay loam. The parent materials are partly weathered gray, brown, and grayish-brown baked Triassic shale and sandstone. Gravel is characteristic throughout the profile in most places.

Whiteford series.—The soils of the Whiteford series have developed from the weathered products of phyllitic slate rock. They resemble the Myersville and Glenelg soils in color. However, they are shallower and more acid than the Myersville soils. They are less deeply weathered, contain much less mica, and are lower in potassium than the Glenelg soils. The A horizon of the Whiteford soils is mostly brown, very friable silt loam. The B horizon is a yellowish-red, firm silty clay loam. The mingled strong-brown, yellowish-red, gray, dark-gray, white, and bluish, partially weathered slaty parent materials are mixed with a small proportion of silty clay loam soil of similar colors. Bedrock is generally at depths between 30 and 40 inches. Slabby blue slate or phyllitic rock fragments are common on the surface and throughout the profile in places.

The Whiteford series consists of Red-Yellow Podzolic soils considered as intergrades to the Gray-Brown Podzolic group because they have browner A horizons, less distinct A_2 horizons, and are less thoroughly leached than typical.

Clifton series.—The Clifton series consists of Red-Yellow Podzolic soils intergrading to the Reddish-Brown Lateritic group. These soils have browner A horizons than typical for Red-Yellow Podzolic soils and resemble Reddish-Brown Lateritic soils in that respect.

500057—60——8

The soils of the Clifton series are among the brownest of the Red-Yellow Podzolic group. They are generally on mountain tops at a fairly high elevation and are associated mostly with Rocky land types. They resemble the Myersville and Fauquier soils in the color of the subsoil. However, the Clifton soils have a darker surface soil that contains larger amounts of organic matter.

The A horizon of the Clifton soils is mostly dark reddish-brown, very friable silt loam. The upper B horizon is yellowish-red, friable, heavy silt loam to silty clay loam. The lower B horizon is mostly yellowish-red to red, slightly firm, heavy silty clay loam. It contains a few greenstone schist particles and some stones, as well as many black mineral films in the lower part. The parent materials are mingled olive, yellow, brownish-yellow, and black, friable, weathered greenstone schist fragments. These fragments are mixed with heavy silt loam soil material of similar colors. Numerous stones and boulders are on the surface and embedded in the profile in many places.

Belvoir, Calverton, and Captina series.—The soils of the Belvoir, Calverton, and Captina series are Red-Yellow Podzolic soils intergrading to the Planosol group. Although such soils are typically moderately well drained, those in Loudoun County are somewhat poorly to moderately well drained. These soils have a moderately well developed to well developed B horizon that is dominantly brownish yellow to yellowish brown. At about 21 inches deep, this horizon is underlain by a mottled fragipan that has a brittle platy structure.

The Belvoir soils developed from the weathered products of granodiorite. They have nearly level to gently undulating relief.

Belvoir loam, 1 mile north of Willisville and 1/8 mile east of State Highway 623, has the following profile:

- A_0 1 to 0 inch, black, light, fluffy duff that contains numerous fine roots.
- A_1 0 to 2 inches, dark grayish-brown (10YR 4/2), very friable loam; moderate, fine to medium, granular structure; numerous fine roots.
- A_2 2 to 10 inches, brownish-yellow (10YR 6/6), very friable loam; weak, moderate, subangular blocky structure that crushes easily to strong, fine, granular structure; a few blue quartz fragments and roots; boundary gradual.
- B_2 10 to 21 inches, fine sandy clay loam mottled with brownish yellow and light gray; mottles are few, faint, and medium; strong, medium, subangular blocky structure; roots are common; boundary abrupt.
- B_{2m} 21 to 37 inches, firm, heavy silty clay loam mottled with strong brown, gray, light gray, and brownish yellow; mottles are numerous, prominent, and coarse; strong, very coarse, platy structure that crushes easily to moderate, medium, platy; very few roots; boundary clear.
- C 37 to 43 inches, friable silt loam soil material mottled with dark brown, white, and light gray; contains a large amount of partially weathered, fine-grained granodiorite rock fragments.

The soils of the Calverton series have developed from the weathered products of shale and sandstone. They resemble the Belvoir soils in color and relief. They are associated with the Bucks, Penn, Readington, and Croton soils. In cultivated areas, the Calverton soils have a brownish-yellow silt loam A horizon, a yellowish-brown to strong-brown silty clay loam upper B horizon, and a mottled strong-brown to reddish-yellow and gray silty clay fragipan. The parent material is friable silt loam soil material mottled with gray, light reddish brown, red,

and reddish yellow. It is mixed with many weathered, red shale particles.

The soils of the Captina series have developed on stream terraces from alluvium derived from limestone and sandstone. In cultivated areas, the A horizon is a yellowish-brown silt loam, the subsoil is a yellowish-brown to strong-brown silty clay loam, and the fragipan is a light silty clay loam and silt loam mottled with gray, strong brown, brownish yellow, yellow, and red. On the lower terraces, the Captina soils have a slightly heavier texture in the pan.

Sequatchie series.—Only one soil of the Sequatchie series is mapped in the county. The parent material is mixed general alluvium on low stream terraces. It originated from limestone, shale, and sandstone. Most areas are next to the Huntington and Lindside soils and are well drained. The B layer is developed to some extent, particularly in having a blocky structure and a reddish hue.

The Sequatchie series is placed in the Red-Yellow Podzolic group because of reddish color of the B horizon and because of other indications of thorough leaching. The degree of horizonation is lower than typical for the group, however, and the series is therefore considered an intergrade to the Gray-Brown Podzolic group.

The Sequatchie soil contrasts with the Elk—a Gray-Brown Podzolic soil also on low stream terraces—by having a reddish rather than a yellowish-brown cast throughout the solum. In addition, it is more weakly developed than the Elk. The texture of the Sequatchie soils in general is somewhat coarser than that of the Huntington and Elk soils, although the texture range includes silt loam.

GRAY-BROWN PODZOLIC SOILS

Gray-Brown Podzolic soils are a zonal group of soils. They have a comparatively thin organic covering and organic-mineral layers over a grayish-brown leached A horizon that rests on an illuvial B horizon. They have developed under deciduous forest in a temperate humid climate.

Generally, these soils have a covering of leaf litter lying on a dark, thin humus. This humus is only slightly or moderately acid and somewhat mixed with mineral soil. The A horizon is grayish brown, crumb structured, and loamy. The A_2 horizon is light grayish brown or grayish yellow. The B horizon is moderately heavy, nut structured, yellowish brown, brown, brownish yellow, or reddish brown. It is lighter colored with depth. The total depth of the solum varies considerably but seldom exceeds 4 feet. Podzolization (*9*) is the main process in the development of these soils.

All series placed in the Gray-Brown Podzolic group in this county are marginal to Red-Yellow Podzolic soils. All of them seem to be more strongly weathered than normal for the Gray-Brown Podzolic group. This is to be expected in a locality where the major well-drained series are Red-Yellow Podzolic soils.

The Gray-Brown Podzolic soils in Loudoun County are of the Chester, Myersville, Unison, Airmont, Elk, Glenelg, Readington, Athol, and Bucks series.

Chester series.—The extensive soils of the Chester series are representative of the Gray-Brown Podzolic great soil group.

Chester loam, undulating phase, in a virgin forested area, has the following profile:

- A_0 ½ to 0 inch, very dark brown (10YR 2/2) forest duff, mostly oak leaves, twigs, and fine roots.
- A_1 0 to 3 inches, dark-brown (7.5YR 3/2), very friable, weak, medium, granular loam; a few small pieces of angular quartz gravel.
- A_2 3 to 7 inches, yellowish-brown (10YR 5/6) to brown (7.5YR 5/4), very friable, moderate, medium, granular loam; a few small pieces of angular quartz gravel.
- B_1 7 to 11 inches, strong-brown (7.5YR 5/6) to yellowish-brown (10YR 5/6), friable heavy loam or light fine sandy clay loam; moderate, fine to medium, subangular blocky structure; small pores plentiful; a few small pieces of quartz gravel; many insect channels and fine roots.
- B_2 11 to 24 inches, strong-brown to yellowish-red (7.5YR 5/6 to 2.5YR 6/6), slightly firm to friable fine sandy clay loam with strong, medium to coarse, subangular blocky structure; numerous small particles of grit and of small quartz pebbles, particularly in lower part.
- B_3 24 to 33 inches, friable loam, dominantly strong brown mottled with lighter shades of brown and yellow; weak, medium, subangular blocky structure that crushes easily to fine, crumb structure; common, fine, faint mottles; many particles of grit and pebbles, both of quartz; many small mica flakes.
- C 33 to 48 inches, weathered granodiorite material mottled with shades of brown, yellow, and gray; many, coarse, prominent mottles; micaceous and friable, with slick feel.

Myersville series.—The soils of the Myersville series are on the slopes of mountains and higher lying ridges. They have developed from weathered products of greenstone (fig. 13). They are finer textured and shallower to bedrock than the Chester soils. The relief is dominantly rolling and hilly. The surface soil is a brown silt loam; the subsoil is strong brown to yellowish red. The parent material is silt loam and silty clay loam material mixed with partly weathered greenstone schist fragments and some quartz gravel. The Myersville soils are mostly medium acid.

Unison series.—The soils of the Unison series have developed principally from greenstone material on the old colluvial lands near mountain foot slopes. In comparison with the Myersville soils, the Unison soils are slightly lighter colored, are heavier textured, and have slower internal drainage in the lower subsoil.

The A horizon is a very friable, brown silt loam to stony silt loam. The B horizon is a strong-brown to yellowish-red, slightly plastic silty clay loam. The parent material is mingled strong-brown, yellowish-red, brownish-yellow, and red, slightly firm silty clay loam. It is mixed with many olive-yellow, yellow, red, and greenish greenstone fragments and black concretions. Some areas of the Unison soils have a thin layer of recent local alluvium. These areas have a thicker surface soil than the Myersville and other upland soils.

Airmont series.—The soils of the Airmont series are strongly acid and stony. They have developed in beds of old colluvial materials consisting chiefly from quartzite and sandstone. The Airmont soils are less well developed than the Thurmont soils. They are associated with the Buckingham soils and Rocky land types.

The A horizon of the Airmont soils is light yellowish-brown to brown, very friable loam to fine sandy loam. The B horizon is a brownish-yellow, friable, light sandy clay loam about 10 to 14 inches thick. The parent ma-

Figure 13.—**Profile of Myersville silt loam, rolling phase. This well-drained, moderately deep, brown soil has developed from the weathered products of greenstone schist.**

terial is very friable sandy loam mixed with many quartzite and sandstone fragments. It is dominantly brownish yellow, mingled with white, yellow, and reddish yellow. Quartz gravel, angular cobbles, and large stones up to boulder size are on the surface and embedded in the profile in most places.

Elk series.—The Elk series consists of well drained to moderately well drained soils on low stream terraces along the Potomac River. There is more contrast among the horizons than in the Sequatchie soils but less than in the Chester and Myersville soils. The Elk soils lack the reddish hue of the Sequatchie. The parent material came chiefly from limestone.

Glenelg and Readington series.—The soils of the Glenelg and Readington series are Gray-Brown Podzolic soils intergrading to Red-Yellow Podzolic soils. The subsoil of the two series is reddish, but the surface soil, or A_2 horizon, is browner than typical of the Red-Yellow Podzolic group.

The Glenelg soils have a darker surface soil than the Chester and Myersville soils and are more micaceous and more acid. Their parent rock was quartz sericite schist. The substratum, which has prominent red, brownish-yellow, and pink mottles, consists of soft loam to light silt loam parent material weathered to great depth. Many mica flakes are abundant throughout the profile.

The Readington soils are associated with the Penn, Bucks, and Calverton soils, and the parent rocks of shaly sandstone, shale, and sandstone are similar. The Readington soils have a better developed profile than the Penn, they are less red than the Bucks, and they are free of a fragipan and better drained than the Calverton. The plowed A horizon is a strong-brown silt loam. The subsoil is a thin, yellowish-red silty clay loam that grades with depth to mottled material. The depth to bedrock is about 32 inches.

Athol series.—The soils of the Athol series have developed from the weathered products of conglomerate limestone. The A horizon is a brown to dark-brown, granular silt loam. The subsoil is a light reddish-brown to dark-red, slightly firm silty clay to clay that is plastic when wet. The parent material is dominantly weathered gravelly material mixed with reddish-brown, light-brown, reddish-yellow, dark-red, and pinkish silty clay loam and silt loam. The gravel is probably chert, quartz, and some impure limestone. Rocky types are common among the Athol soils.

Bucks series.—The soils of the Bucks series have developed from weathered products of sandstone conglomerate, shale, and sandstone. Like the Penn soils, these soils have probably derived much of their color from the reddish parent rock. However, the Bucks soils have a better developed profile and a thicker solum than the Penn.

REDDISH-BROWN LATERITIC SOILS

Reddish-Brown Lateritic soils (*9*) are a zonal group of soils with dark reddish-brown, granular surface soils and red, friable clay B horizons. They developed from red or reticulately mottled lateritic parent material in a tropical climate under a forest vegetation.

Laterization, accompanied by little or no podzolization, dominated in the development of these soils. Laterization is the process of silica removal, with consequent increase in the content of the alumina and iron and decrease in the base-exchange capacity of the soil.

The Reddish-Brown Lateritic soils in Loudoun County have developed from parent materials that are generally fairly high in bases. These parent materials have been in place a long time. The well-developed profile has a uniformly red or dark-red, firm B horizon that is fairly thick.

The Reddish-Brown Lateritic soils in the county are of the Fauquier, Dyke, and Montalto series.

Fauquier series.—The Fauquier soils are the most extensive. They have developed from the weathered products of greenstone schist and are associated with the Myersville, Catoctin, Meadowville, and Rohrersville soils. Fauquier soils occur on the tops and sides of the higher rolling ridges and mountains. These soils are less dark in color in the deeper part of the profile than is typical for the Reddish-Brown Lateritic group and are therefore considered intergrades to the Red-Yellow Podzolic group.

Fauquier silt loam in a cultivated field, near a junction of State Highways 770 and 704, 200 yards east of Woodburn, has the following profile:

- A_p 0 to 7 inches, reddish-brown, friable silt loam; moderate to strong, granular structure; a few fine pieces of quartz gravel and many grass roots.
- B_2 7 to 24 inches, red (2.5YR 4/6), slightly firm silty clay to clay; moderately plastic when wet; moderate, medium to coarse, subangular blocky structure; black and yellowish streaks common on cut surface; few black mineral films on soil peds.
- B_3 24 to 44 inches, friable silty clay loam, dominantly red (2.5YR 4/8) mingled with yellowish red (5YR 5/8), reddish yellow (5YR 6/8), and strong brown (7.5YR 5/8); weak to moderate, fine to medium, subangular blocky structure that crushes easily to strong, fine subangular blocky; many black films on soil peds and many weathered yellow, brown, and greenish greenstone fragments; boundary is gradual.
- C 44 to 60 inches, mingled strong-brown, reddish-yellow, red, yellow, and olive-yellow, weathered greenstone fragments mixed with silt loam soil material. Small, shiny mica flakes are common in this material; depth to hard rock is generally less than 6 feet.

Dyke series.—The Dyke series consists of well-drained soils on the colluvial lands. They have developed from old colluvial beds, mainly of greenstone or basic soil materials. The A horizon is a brown to reddish-brown silt loam to silty clay loam. The B horizon is a red to dark-red, plastic, sticky fine structured clay to silty clay. The parent materials consist of highly weathered beds of yellowish, black, and greenish greenstone materials mixed with friable silt loam and silty clay loam.

Montalto series.—The soils of the Montalto series have developed from syenite and diabase rock materials. They are associated with the Irdell, Mecklenburg, Legore, and Elbert soils. Although the Montalto soils resemble the Fauquier soils in color, they are more friable and slightly coarser textured. The B horizon is of finer structure. The Montalto soils are shallower to bedrock than the Fauquier and Clifton soils.

The Montalto soils are less dark in color than typical for the Reddish-Brown Lateritic group and have some indications of an A_2 horizon. They are consequently considered intergrades to Red-Yellow Podzolic soils although placed in the Reddish-Brown Lateritic group.

Intrazonal soils

Intrazonal soils (*9*) have more or less well-developed soil characteristics that reflect the dominating influence of some local factor of relief, parent material, or age over the normal effect of climate and vegetation.

The intrazonal soils in Loudoun County are members of the Planosol and Low-Humic Gley great soil groups.

PLANOSOLS

Planosols are an intrazonal group of soils (*9*) with eluviated surface horizons underlain by B horizons that are more strongly illuviated, cemented, or compacted than those in the associated normal soils. They have developed upon nearly flat upland surface under grass or forest vegetation in a humid or subhumid climate. Podzolization and gleization are soil-forming processes involved in their development. The Planosols are characterized by the accumulation of a well-defined layer of clay or cemented material at various depths below the surface. This development has taken place on nearly level areas where drainage is restricted.

In Loudoun County, the Planosols are divided into two groups: Those with a claypan and those with a fragipan. The soils with claypans are characterized by an abrupt textural change from a loamy A horizon to a plastic B horizon. The soils with fragipans are characterized by a brittle, mottled (somewhat bleached) compact layer directly below and comparable in texture to the B_2 horizon.

Seven of the soil series are classified as Planosols in Loudoun County. They are the Iredell, Kelly, and Elbert soils, which have claypans; and the Rohrersville, Croton, Trego, and Robertsville soils, which have fragipans.

Iredell, Kelly, and Elbert series.—All of these soils have a claypan. The Iredell soils developed from diabase, the Kelly soils from stratified diabase and baked shale, and the Elbert soils from weathered products of diabase and syenite as well as from some local alluvial and colluvial materials.

The Iredell and Kelly soils are moderately well drained. The Elbert soils are poorly drained.

Elbert silt loam, level phase, 2 miles southwest of Lenah, just south of Highway No. 705, has the following profile:

- A_0 1 to 0 inch, black (10YR 2/1) to very dark brown (10YR 2/2), light fluffy duff; contains a network of fine roots.
- A_1 0 to 3 inches, light-gray, friable silt loam (2.5Y 7/2) with low-contrast and indistinct small mottlings of yellow (2.5Y 7/6) and yellowish brown (10YR 5/6); coarse, weak, granular structure; roots are numerous in the layer.
- A_2 3 to 7 inches, light-gray, friable silt loam (10YR 7/2) with medium-contrast and distinct mottlings of brownish yellow (10YR 6/6); moderate, medium, subangular blocky structure; contains fewer roots than the layer above.
- B_1 7 to 10 inches, yellowish-brown (10YR 5/6), light, slightly plastic and slightly sticky silty clay with low-contrast and indistinct light-gray (10YR 7/2) mottles; fine, strong, blocky structure; few roots.
- B_{21} 10 to 20 inches, yellowish-brown (10YR 5/6), very plastic and sticky clay with low-contrast mottlings of light brownish gray (10YR 6/2); massive structure.
- B_{22} 20 to 42 inches, yellowish-brown (10YR 5/4) very plastic and sticky clay with massive structure; the lower 3 inches are brown (10YR 4/3).
- C 42 to 52 inches, very friable light silty clay loam and highly weathered diabase rock material; yellowish brown (10YR 5/8) mingled with white (10YR 3/2) and light gray (10YR 7/2); contains lenses of dark-gray (10YR 4/1), very plastic sticky clay from 1 to 2 inches in diameter.

All of the soils with claypans are medium to strongly acid. The surface layer is light in color (brownish yellow, light olive brown, or yellowish brown). The subsoil shrinks and cracks when dry. The depth to partly weathered bedrock ranges from 24 to 50 inches. Most of the acreage of these soils is nearly level to undulating.

Rohrersville, Croton, Trego, and Robertsville series.—The soils of this group have a fragipan. In Loudoun County, the Planosols with fragipans are poorly to somewhat poorly drained, light colored, and strongly acid. The A horizon contains only a small amount of organic matter. These soils are nearly level to gently sloping. Slopes average less than 3 percent. Gleization has taken place, at least in the subsoil. In all of these soils, moisture fluctuates during the year from extreme wetness to extreme dryness.

The Rohrersville and Trego soils are somewhat poorly drained. They have more yellow and brown in the subsoil than the Croton and Robertsville soils, which are poorly drained. The Trego soils have the best drainage of the soils with fragipans. They are free of mottling to a depth of 14 inches. They developed from old colluvium that originated chiefly from quartzite, acid schist, and greenstone. The Rohrersville soils are mottled throughout their subsurface layers. They have developed in the upland over greenstone.

Croton soils have developed from residual material of shale, sandstone, and shaly sandstone, similar to that from which the Penn and Bucks soils were developed.

Only one soil of the Robertsville series is mapped in the county. It occurs on stream terraces and consists of material chiefly from limestone. The Robertsville soil in Loudoun County has an especially strongly developed profile. It also has an abrupt textural change from the A to the B layer that is characteristic of claypan soils. The layer at a depth of 32 inches, however, has the characteristics of the fragipan.

LOW-HUMIC GLEY SOILS

Low-Humic Gley soils (*8*) comprise an intrazonal group of imperfectly drained to poorly drained soils with very thin surface horizons, moderately high in organic matter, over mottled gray and brown, gleylike mineral horizons with a low degree of textural differentiation. The Worsham is the only series of this group in the county.

Worsham series.—The Worsham soils developed on flat depressional areas from colluvium that originated from schist, granodiorite, and greenstone. They are dominantly gray, are strongly acid, and are low in organic matter. They have some development of a B layer. These soils are slowly permeable and range during the year from excessively wet to excessively dry. Apparently the native vegetation was oak and other commonly associated hardwoods.

Azonal soils

Azonal soils are defined (*9*) as a group of soils without well-developed profile characteristics, owing to their youth or to conditions of parent material or relief that prevent the development of a normal or zonal profile. The azonal soils in Loudoun County are members of the Lithosol and Alluvial great soil groups.

Some upland soils have steep slopes where natural or geologic erosion removes much material developed through soil-forming processes. Furthermore, much of the rainfall runs off of these slopes instead of percolating through the profile. The normal, or maximum, effects of climate and vegetation are modified and overcome by the effects of relief. These soils do not have well-developed profiles. They have very few of the characteristics of the zonal, or normal, soils of the region. They have reached a point where soil-forming processes are in equilibrium with natural erosion. Where such soils have developed from consolidated bedrock materials, they are of the Lithosol great soil group.

Soils that have developed from recent alluvial or colluvial materials and have been in place only a short time do not have clearly developed profiles. These young soils have only a few characteristics of zonal soils. They are of the Alluvial great soil group.

LITHOSOLS

Lithosols are an azonal group of soils (*8*) having no clearly expressed soil morphology and consisting of a freshly weathered mass of rock fragments. They are largely confined to steeply sloping land.

In Loudoun County, the Catlett, Manor, Catoctin, Legore, Buckingham, Hazel, Brandywine, and Penn series are classified as Lithosols. These soils have formed from residual products of igneous, metamorphic, and sedimentary rocks. The rocks were chiefly granodiorite, schist, quartzite, shale, sandstone, sandstone conglomerate, diabase, and syenite.

Catlett, Manor, Catoctin, Legore, Buckingham, Hazel, Brandywine, and Penn series.—The soils of this group have slopes that generally exceed 7 percent. Because of the nature of these soils and their position on the landscape, geologic erosion has removed soil material too rapidly to allow mature profiles to develop. Much of the acreage, however, has some profile development, as evidenced by a thin, weak A_2 layer and a thin B layer with weak subangular blocky structure and with more chroma and slightly finer texture than the layer above. A thin A_2 layer is common to practically all of the soils. The depth to bedrock ranges from very shallow to shallow. Some rock outcrops occur.

The Catlett soils are the shallowest of the group and most closely represent the Lithosol group. The Manor soils are the deepest; they have a thin B and a thick (5 to 90 feet) C layer or substratum over bedrock. The Catlett soils are very similar to the Penn soils, but they have grayish-brown color in the A horizons and gray, baked shaly parent materials. They are associated with the Brecknock soils. Many areas are shaly and gravelly.

Catoctin silt loam, steep phase, in a pasture has the following profile:

- A_1 0 to 3 inches, dark-brown (7.5YR 4/4), very friable silt loam; moderate, medium, granular structure; many grass roots; a few fishworms and white grubs are present.
- A_2 3 to 8 inches, strong-brown (7.5YR 5/6), very friable silt loam; strong, medium, granular structure; many roots; many small greenstone schist fragments in lower part; boundary gradual.
- A_3 8 to 12 inches, strong-brown to yellowish-red (5YR 5/8), friable, heavy silt loam with weak, fine to medium, subangular blocky structure that crushes easily to moderate granular; many greenstone schist particles.
- C 12 to 15 inches, soft olive, black, reddish-yellow, yellowish-red, and strong-brown weathered greenstone rock materials, mixed with a small amount of yellowish-red and strong-brown silt loam soil material; hard rock below 15 inches.

The soil is medium acid. The depth to hard rock generally ranges from 6 inches to 20 inches. Some areas contain rock outcrops and loose stones and cobbles.

The Legore soils resemble the Catoctin in color and in texture but have formed from the weathered products of diabase and syenite. They are associated with the Iredell, Mecklenburg, and Montalto soils. Only the shallow phases of Legore soils are mapped in the county.

The Buckingham soils occur along the rougher mountain slopes and are generally stony. They have formed from the weathered products of sandstone and quartzite. They resemble the Brandywine soils but are lighter in color and more acid. They are much less fertile and productive.

The Hazel soils resemble the Catoctin soils, except that they have a slightly lighter color. They were derived principally from phyllitic slate with some greenstone and arkosic sandstone materials.

ALLUVIAL SOILS

Alluvial soils constitute an azonal group of soils (*9*) developed from transported and fairly recently deposited material (alluvium) and characterized by a weak modification (or none) of the original material by soil-forming processes.

The Alluvial soils are young or very young. They show little or no contrast in color and texture within the profile. In places, however, there is more distinct structure in the upper part of the C horizon than in the deeper part. The differentiation among the series is made largely on characteristics determined by parent material and drainage.

The Alluvial soils in Loudoun County are in 12 series. The Congaree, Chewacla, and Wehadkee form a catena of soils developed from general alluvium from the Piedmont Upland; the Bermudian, Rowland, and Bowmansville form a catena developed from general alluvium from the Piedmont Lowland; and the Huntington, Lindside, and Melvin soils form a catena developed from general alluvium that originated chiefly from limestone. Three additional series, the Manassas, Meadowville, and Emory, are included in the Alluvial group. They are all well drained and were formed from local alluvium in uplands.

Congaree, Chewacla, and Wehadkee series.—The Congaree series has formed from alluvial materials that were derived from uplands underlain by both basic and acidic rocks and deposited near streams. Rounded gravel and small cobbles underlie the soils in places at a depth of 3 to 8 feet.

A profile of Congaree silt loam in a cultivated field:

- A_1 0 to 14 inches, brown (7.5YR 5/4), very friable light silt loam; very weak, fine, granular structure; soft when dry; moderate amount of organic matter; much insect activity; many small mica flakes.
- A_3 14 to 50 inches, brown (7.5YR 5/4), very friable, heavy silt loam; weak, medium, granular structure; slightly heavier textured at 20 to 30 inches; many small mica flakes.
- C 50 to 63 inches, brown (7.5YR 5/4, dry) to brownish-yellow (10YR 6/6) loam to fine sandy loam soil material containing yellowish, greenish, and light-brown mottles; some small quartz gravel and basic rock fragments; mottles more numerous with increasing depth; mica flakes abundant.

Insects have carried material downward from the A_1 horizon into the lower part of the A_3, and upward from the C into the A_1. The A horizon is medium acid (pH value 5.6 in the A_1 and 5.8 in the A_3).

The degree of mottling and the condition of drainage differentiate the Chewacla and Wehadkee soils from the Congaree. Chewacla silt loam has a brown, very friable silt loam surface soil about 9 inches thick. It has a mottled to highly mottled, very friable to friable subsoil. Wehadkee silt loam has a brown surface soil, mingled with yellowish brown, grayish brown, and light brownish gray. The subsoil is mottled throughout. This soil has some characteristics of the Low-Humic Gley great soil group.

Bermudian, Rowland, and Bowmansville series.—These soils differ from the Congaree, Chewacla, and Wehadkee soils and the Huntington, Lindside, and Melvin soils mainly in parent materials. In general, they have thinner deposits than the soils of these two catenas and contain less mica than the Congaree, Chewacla, and Wehadkee soils. They have developed from alluvium that washed chiefly from soils underlain by sandstone, shale, conglomerate, diabase, and syenite. In many places, these bottomland soils have the reddish-brown colors of the Piedmont Lowland soils and rock materials.

Huntington, Lindside, and Melvin series.—These soils have developed from general alluvium that originated chiefly from limestone. They are slightly finer textured, less micaceous, slightly browner, and less acid than the Congaree, Chewacla, and Wehadkee soils.

Manassas, Meadowville, and Emory series.—These soils have developed from young local alluvium. The Manassas soils consist of material that originated chiefly in the Bucks and Penn soils of the Piedmont Lowland. They are redder than the Meadowville soils and are shallower and lower in fertility. The Meadowville soils developed from young local alluvium that originated chiefly from such Piedmont Upland soils as the Chester, Eubanks, and Fauquier.

The Emory and Meadowville soils have about the same color and texture. The Emory soils consist of young local alluvium from limestone.

Additional Facts About the County

Water Supply [5]

Springs, wells, streams, and artificial ponds provide an adequate supply of water for people and livestock, except during the uncommon periods of prolonged drought.

Although springs occur throughout the county, they are not an important source of water for most of the people of the county. They are more numerous in the Piedmont and Blue Ridge provinces, where the underlying rocks are schist, granodiorite, and greenstone.

Most farmers get their water from wells. The amount of well water varies considerably, depending on the geological formation and the soil. In the Piedmont and Blue Ridge provinces of western Loudoun County, wells are the best source of water. The supply of water is not as good in greenstone as in granodiorite or schist. In granodiorite rocks, a flow of ½ to 30 gallons a minute generally can be expected at depths of 28 to 200 feet. In schist, a flow of ½ to 60 gallons can be expected at 30 to 305 feet.

The water supply from wells, springs, and streams is not as good in the Piedmont Lowland or Triassic Lowland as it is in the rest of the county. However, the soils in this area are better for farm ponds and dams, since they are generally less permeable than elsewhere. In areas underlain by shale, sandstone, and conglomerate, the well water is generally hard and objectional because of the amount of iron in solution. Records show that

[5] This section is based to some extent on data of the Virginia Geological Survey, Division of Water Resources.

wells in these areas can be expected to have a flow of ½ to 45 gallons a minute at depths of 37 to 300 feet. The wells are generally harder to dig and more costly than in areas underlain by schist. In areas underlain by diabase and syenite, which are the hardest rocks in the county, the wells are costly and difficult to dig. They usually have a flow of 1 to 12 gallons a minute at depths of 25 to 110 feet.

Surface water is plentiful. Many good pond sites occur in all parts of the county. From 500 to 600 ponds have been built in recent years for recreation and livestock. Few ponds are large enough for irrigation. The Potomac River forms the northern boundary of the county. Many streams furnish a permanent source of good soft water free of pollution.

Vegetation

All of the county was originally covered with hardwood forest and a scattering of Virginia pine and redcedar. Yellow-poplar and mountain hardwoods were mostly in the Blue Ridge province and the Piedmont Upland. Oak, scattered Virginia pine, and redcedar were more plentiful in the Piedmont Lowland or Triassic Lowland. The best long-bodied timber grew on the most productive soils of the Piedmont Upland in Loudoun Valley.

Except for the small amount used to build the necessary farm buildings, most of the timber from pioneer clearings was rolled into piles and burned. At present, only about 16 percent of the county is wooded. Little virgin timber remains. Most stands of timber consist of hardwoods, but there are a few pure stands of Virginia pine. The hardwoods are mainly oak (white, red, pin, black, post, blackjack, and chestnut), hickory, maple, beech, yellow-poplar, black locust, walnut, sassafras, dogwood, and persimmon.

Most of the woodland is in the mountains or on areas that are too stony, steep, wet, or shallow for good crops or pasture. The best timber is on good soils in some of the farm woodlots in the Piedmont Upland area and in mountain coves. Fairly large tracks are on the Iredell and Kelly soils in the Piedmont Lowland or Triassic Lowland; in these areas, however, the soils are unfavorable for good trees, crops, or pasture.

In places, there is a direct correlation between the soils and the species of trees they will naturally produce. In most places on the wet, flat Worsham and Elbert soils of the Piedmont province, pin oak grows in almost pure stands. On the heavy, clayey Iredell and Kelly soils of the Piedmont Lowland or Triassic Lowland, the trees are mostly scrubby white oaks. The stands, however, have a large proportion of blackjack and post oaks. On the deep, friable, well-drained Chester soils of the Piedmont Upland, the species are practically all white and red oaks, which produce large, long-bodied trees. On the other hand, the same species on the shallow, droughty Penn and Catlett soils grow very slowly and produce short-bodied trees. Poplar, walnut, and some ash are the main species on colluvial areas in mountain coves on Unison and Airmont soils and Stony colluvial land, rolling and hilly phases.

On the first bottoms where the Congaree, Chewacla, and Wehadkee soils and Mixed alluvial lands are dominant, such trees as sycamore, river birch, boxelder, white elm, and willow are the most common. The species and rate of growth also vary greatly on different exposures on the same soil type. Chestnut oak is the characteristic growth on some of the ridges where the soils are rocky, shallow, or both. Eastern and northern exposures and moist coves generally produce the best species and more long-bodied timber.

The forest understory consists mainly of laurel, huckleberry, spicewood, wild grape, running cedar, azalea, smilax or greenbrier, mountain-tea, and serviceberry.

The species and growth of grasses and weeds vary on the different soils according to management. Idle fields contain many plants, including broomsedge, dewberry, blackberry, cinquefoil, hawkweed, ragweed, aster, greenbrier, sumac, orchardgrass, bluegrass, whiteclover, wild onion, beggarweed, stickweed, oxeye daisy, sourgrass, sheep sorrel, Spanish needle, crabgrass, lespedeza, and narrowleaf plantain.

The herbage in properly managed permanent pastures is dominantly bluegrass, whiteclover, and crabgrass. There is some redtop, orchardgrass, hawkweed, narrowleaf plantain, broomsedge, and other weeds and grasses. Temporary pastures used in long rotations consist mostly of orchardgrass, but they have some fescue, ladino clover, timothy, lespedeza, and redtop. Chickweed is common in many alfalfa fields.

Organization, Settlement, and Population

Loudoun County was established (*10*) by an act of the Virginia assembly on June 8, 1757. In 1798, a small part was returned to Fairfax County. The county was named for John Campbell, 4th Earl of Loudoun. Leesburg was established as the county seat in 1758 and named after Francis Lightfoot Lee.

The main tide of immigrants came from older settlements in Virginia. A few came from Pennsylvania and Maryland. Early settlers were mainly English, Scotch, and Scotch-Irish; some were German.

In 1790, about 33 years after the county was established, the population was about 18,777. In 1950, the population was 21,147. Most of the inhabitants are engaged in agriculture. Industries are minor and employ few people. A small proportion of the population is employed in Washington, D. C., or nearby towns in adjoining counties.

Transportation, Market, and Community Facilities

Loudoun County has good roads. United States Highway No. 50 and State Highway No. 7 cross the county from east to west. United States Highway No. 15 crosses the county in a north-south direction. Highways 15 and 7 meet at Leesburg, the county seat. State Highway No. 9 joins Highway No. 7 at Clarkes Gap and runs northwest to West Virginia. Practically all the farms are reached by improved roads.

A branch line of the Washington and Old Dominion Railroad serves Ashburn, Leesburg, and Hamilton and extends as far as Purcellville.

The main market is the livestock market at Leesburg. Some orchardgrass seed is sold to seed dealers in Purcellville. Most of the livestock and dairy products are sold at markets in Baltimore, Md., and Washington, D.C.

Churches and schools are in all parts of the county. A consolidated high school is near Leesburg in the central part of the county. Telephone service is generally available. Many power transmission lines and two gas pipelines cross the county.

Agriculture

The total number of farms in 1954 was 1,438, a decrease from 1,609 in 1950. The area in farms was 277,211 acres, or about 84 percent of the total land in the county. About 48,048 acres was in farm woodland. The total cropland harvested in 1954 was 90,274 acres.

Size and type of farms and farm tenure

The average size of farms in 1954 was about 193 acres. About 311 farms were dairy farms, and 391 were livestock farms other than dairy and poultry. About 96 were general farms, 51 were poultry farms, and 530 were miscellaneous and unclassified. Full and part owners operated 1,204 farms; managers, 33; and tenants, 201, or 14 percent. Share tenants were on 92 farms, cash tenants on 33, and croppers on 14.

Crops

Corn is the principal grain crop, but wheat, oats, and barley are important. Corn acreages have decreased since 1929; the 1954 wheat acreages have shown a steady decrease. Hay crops, including 152 acres of soybeans and cowpeas used for hay, have shown a continuous increase since 1919. Orchardgrass is the most important grass, and seed was harvested from 5,279 acres in 1954.

The acreage of the principal crops grown in stated years is shown in table 7.

Livestock and livestock products

Livestock and livestock products are the greatest source of income from farms. Dairy products accounted for a little less than half of the cash farm income in 1954. In that year, there were 55,570 cattle and calves, 14,313 hogs and pigs, and 7,666 sheep and lambs on farms. Of the total cattle and calves, 16,076 were milk cows.

Forest products

Forest products are of some importance. According to the 1954 Federal census, firewood and fuel wood cut amounted to about 7,769 cords. In addition, 46,498 fence posts, 917 thousand board feet of saw logs and veneer logs, and 73 cords of pulpwood were cut.

Farm improvements

There were 1,074 telephones on farms in 1954. In the same year, 1,404 farms had electricity and 776 farms had a total of 961 trucks. There were 570 artificial ponds reported on 383 farms.

Fertilizer and lime

A total of 14,412 tons of commercial fertilizer was used on 978 farms in 1954, and a total of 25,199 tons of lime was used on 521 farms. In the same year, 461 farms reported that 4,437 tons of commercial fertilizer were used on hay and cropland pasture and 785 farms reported that 4,170 tons of commercial fertilizer were used on corn.

TABLE 7.—*Acreage of the principal crops and number of fruit trees and grapevines of bearing age*

Crop	1929	1939	1949	1954
	Acres	*Acres*	*Acres*	*Acres*
Corn for all purposes	34, 928	32, 324	24, 061	25, 416
Corn, silage	4, 879	3, 921	4, 614	7, 094
Oats, threshed or combined	1, 086	821	2, 182	3, 433
Wheat	30, 709	21, 644	15, 490	9, 155
Barley, threshed or combined	230	6, 099	6, 090	6, 909
Rye, threshed or combined	1, 299	1, 597	141	393
Hay crops	19, 700	24, 785	39, 212	40, 326
Timothy, clover, and mixtures of grasses	14, 978	15, 266	18, 100	16, 542
Alfalfa	1, 515	3, 308	6, 484	7, 496
Lespedeza	(1)	2, 984	8, 377	3, 925
Small grains	51	560	591	1, 442
Other hay cut	3, 156	2, 667	5, 660	10, 921
Soybeans for all purposes	1, 201	875	418	196
Irish potatoes	259	177	[2] 100	[3] 50
Vegetables harvested for sale	32	13	92	215
	Number [4]	*Number* [4]	*Number* [4]	*Number*
Apple trees	85, 433	47, 972	32, 958	15, 540
Peach trees	6, 975	11, 207	5, 066	11, 223
Cherry trees	578	516	2, 842	2, 636
Grapevines	11, 167	2, 940	2, 314	4, 013

[1] Not reported.
[2] Does not include acreage for farms with less than 15 bushels harvested.
[3] Does not include acreage for farms with less than 20 bushels harvested.
[4] One year later than year at head of column.

Glossary

Acidity. The degree of acidity of the soil mass expressed in pH values or in words as follows (7):

	pH		*pH*
Extremely acid	below 4.5	Neutral	6.6–7.3
Very strongly acid	4.5–5.0	Mildly alkaline	7.4–7.8
Strongly acid	5.1–5.5	Moderately alkaline	7.9–8.4
Medium acid	5.6–6.0	Strongly alkaline	8.5–9.0
Slightly acid	6.1–6.5	Very strongly alkaline	9.1 and higher

Alluvium. Fine material, as sand, mud, or other sediments, deposited on land by streams.

Bedrock. Solid rock underlying soils.

Catena, soil. A group of soils, within a specific soil zone, developed from similar parent material but with unlike soil characteristics because of differences in relief or drainage.

Clay. As a soil separate, the mineral soil particles less than 0.002 mm. in diameter. As a soil textural class, soil material that contains 40 percent or more of clay, less than 45 percent of sand, and less than 40 percent of silt.

Colluvium. Mixed deposits of rock fragments and soil material near the bases of slopes. The materials have accumulated through soil creep, slides, and local wash.

Consistence. A soil term expressing degree of cohesion and adhesion of soil particles or their resistance to forces tending to deform or rupture the aggregate. Terms used in the report to describe consistence are *compact, firm, friable, hard, loose, plastic, slightly hard, very firm, very friable, very hard,* and *very plastic.*

Compact. Dense and firm but without cementation.

Firm. Soil material crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Friable. Soil material crushes easily under gentle to moderate pressure between thumb and forefinger and coheres when pressed together.

Hard. Moderately resistant to pressure; soil material can be broken in the hands without difficulty but is barely breakable between thumb and forefinger.

Loose. Noncoherent.

Plastic. Wire formable; moderate pressure required for deformation of the soil mass.

Very firm. Soil material crushes under strong pressure; barely crushable between thumb and forefinger.

Very friable. Soil material crushes under very gentle pressure but coheres when pressed together.

Very hard. Very resistant to pressure; can be broken in the hands only with difficulty; not breakable between thumb and forefinger.

Contour tillage. Furrow plowed at right angles to the direction of slope at the same level throughout and ordinarily at fairly close intervals.

Eluviation. The movement of material from one place to another within the soil, in solution or in suspension, when there is an excess of rainfall over evaporation. Horizons that have lost material through eluviation are referred to as eluvial and those that have received material as illuvial.

Erosion, soil. The wearing away or removal of soil material by water or wind.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants.

First bottom. The normal flood plain of a stream; land along a stream subject to overflow.

Genesis. Mode of origin of the soil, referring particularly to the process responsible for the development of the solum from the unconsolidated parent material. (*See also*, Horizon, soil.)

Granular structure. Roughly spherical aggregates that may be either hard or soft, generally more firm than crumb structure and without the distinct faces of blocky structure. (*See also*, Structure, soil.)

Great soil group (soil classification). A broad group of soils having fundamental characteristics in common.

Green-manure crop. Any crop grown and plowed under to improve the soil, especially by the addition of organic matter.

Horizon, soil. A layer of soil, approximately parallel to the soil surface, with distinct characteristics produced by soil-forming processes.

Horizon A. Upper horizon of the soil mass from which material has been removed by percolating waters; the eluviated part of the solum; the surface soil. This horizon is generally divided into two or more subhorizons, of which A_0 is not a part of the mineral soil but the accumulation of organic debris on the surface. Other subhorizons are designated as A_1, A_2, and so on.

Horizon B. The horizon of deposition to which materials have been added by percolating waters; the illuviated part of the solum; the subsoil. This horizon may be divided into several subhorizons, depending on the color, structure, consistence, and character of the material deposited. These layers are designated as B_1, B_2, B_3, and so on.

Horizon C. Horizon of partly weathered material underlying the B horizon; the substratum; generally the parent material.

Horizon D. Any stratum underlying the C, or the B if no C is present, which is unlike C, or unlike the material from which the solum has been formed.

Illuviation. See Eluviation.

Internal drainage. The rate of movement of water through the soil profile. This rate is affected by the texture of the surface soil and subsoil and by the height of the ground-water table, either permanent or perched. Relative terms for expressing internal drainage are *very rapid, rapid, medium, slow, very slow*, and *none.*

Leaching, soil. Removal of materials in solution.

Massive. Large uniform masses of cohesive soil, sometimes with ill-defined and irregular breakage, as in some of the fine-textured alluvial soils; structureless. (*See also*, Structure, grade.)

Morphology. The physical constitution of the soil expressed in the kinds of horizons, their thickness and arrangement of the profile, and the texture, structure, consistence, porosity, and color of each horizon.

Mottles, soil. Contrasting color patches that vary in number and size. Descriptive terms are as follows: Contrast—*faint, distinct*, and *prominent;* abundance—*few, common*, and *many;* and size—*fine, medium*, and *coarse.* The size measurements are the following: *Fine*, commonly less than 5 mm. in diameter along the greatest dimension; *medium*, commonly ranging between 5 and 10 mm. along the greatest dimension; and *coarse*, commonly more than 15 mm. along the greatest dimension (*5*).

Natural drainage. Refers to those conditions which existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be due to other causes, as sudden deepening of channels or sudden blocking of drainage outlets. The following relative terms are used to express natural drainage: *Excessively drained, somewhat excessively drained, well drained, moderately well drained, imperfectly or somewhat poorly drained, poorly drained*, and *very poorly drained.*

Excessively drained. Water is removed from the soil very rapidly. Excessively drained soils commonly are shallow to bedrock and may be steep, very porous, or both. Enough precipitation commonly is lost from these soils to make them unsuitable for ordinary crop production.

Somewhat excessively drained. Water is removed from the soil rapidly so that only a relatively small part is available to plants. Only a narrow range of crops can be grown on these soils, and yields are usually low without irrigation.

Well drained. Water is removed from the soil readily but not rapidly. A well-drained soil has "good" drainage.

Moderately well drained. Water is removed from the soil somewhat slowly, so that the profile is wet for a small but significant part of the time.

Imperfectly or *somewhat poorly drained.* Water is removed from the soil slowly enough to keep it wet for significant periods, but not all of the time.

Poorly drained. Water is removed so slowly that the soil remains wet for a large part of the time. The water table is commonly at or near the surface during a considerable part of the year.

Very poorly drained. Water is removed from the soil so slowly that the water table remains at or on the surface the greater part of the time.

Normal soil. A soil having a profile in equilibrium or nearly in equilibrium with its environment; developed under good but not excessive drainage from parent material of mixed mineral, physical, and chemical composition. In its characteristics it expresses the full effects of the forces of climate and living matter.

Nutrients, plant. The elements taken in by the plant, essential to its growth, and used by it in the elaboration of its food and tissue. These include nitrogen, phosphorus, calcium, potassium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps others obtained from the soil; and carbon, hydrogen, and oxygen, obtained largely from the air and water.

Parent material. The unconsolidated mass from which the soil profile develops. (*See also*, Horizon C; Profile, soil; and Substratum.)

Permeability. That quality of the soil that enables water or air to move through it.

Phase, soil. A subdivision of the soil type based on minor variations; a mapping unit. The variations are chiefly in such external characteristics as relief, stoniness, or erosion.

Productivity, soil. The capability of a soil to produce a specified plant (or plants) under a given system of management.

Profile, soil. A vertical section of the soil, from the surface into the parent material.

Reaction. See Acidity.

Relief. The elevation or inequalities of the land surface, the slope gradient, and the pattern of these.

Sand. Small rock or mineral fragments with diameters ranging between 0.05 mm. and 2.0 mm. The term "sand" is also applied to soils containing 90 percent or more of sand.

Series, soil. A group of soils having the same profile characteristics except for surface texture. They have the same general range in color, structure, consistence, and sequence of horizons and the same general conditions of relief and drain-

age. Generally they are of common or similar origin and mode of formation.

Silt. Small mineral soil grains ranging from 0.05 mm. to 0.002 mm. in diameter.

Soil. The natural medium for the growth of land plants on the surface of the earth; composed of organic and mineral materials.

Soil separates. The individual size groups of soil particles, as sand, silt, and clay.

Soil slope. The incline of the surface of a soil. It is generally expressed in percentage of slope, which equals the number of feet of fall per 100 feet of horizontal distance. There are five classes by soil slope gradient in Loudoun County:

Names	*Limits*
Nearly level	0 to 2 percent
Undulating	2 to 7 percent
Rolling	7 to 14 percent
Hilly	14 to 25 percent
Steep	25 percent+

Soil textural classes. Classes of soil based on the relative proportion of soil separates. The principal classes, in increasing order of the content of finer separates, are as follows: *Sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.*

Solum. The genetic soil developed by soil-building forces. In normal soils, the solum includes the A and B horizons, or the upper part of the soil profile above the parent material.

Structure, soil. The morphological aggregates in which the individual soil particles are arranged. It may refer to the natural arrangement of the soil when in place and undisturbed or to the soil at any degree of disturbance. Soil structure is classified according to *grade, class,* and *type.* A soil is described as structureless when there are no observable aggregates. Structureless soils may be massive (coherent) or single grain (noncoherent).

Grade. Degree of distinctness of aggregation; expresses the differential between cohesion within aggregates and adhesion between aggregates. Terms: *Structureless* (*single grain* or *massive*), *weak, moderate,* and *strong.*

Class. Size of soil aggregates. Terms: *Very fine* or *very thin, fine* or *thin, medium, coarse* or *thick,* and *very coarse* or *very thick.*

Type. Shapes for soil aggregates. Terms: *Platy, prismatic, columar, blocky* or *angular blocky, subangular blocky, granular,* and *crumb.* Examples of soil-structure grade, class, and type: Moderate, coarse, blocky.

Subsoil. Technically, the B horizon, roughly that part of the profile below plow depth.

Substratum. Material underlying the subsoil. (*See also,* Horizon, soil.)

Surface runoff. This term refers to the amount of water removed by flow over the surface of the soil. The amount and rapidity of surface runoff are affected by factors such as texture, structure, and porosity of the surface soil; the vegetative covering; the prevailing climate; and the slope. The degrees of surface runoff are expressed as follows: *Very rapid, rapid, medium, slow, very slow,* and *ponded.*

Surface soil. Technically, the A horizon; commonly, the part of the upper profile usually stirred by plowing.

Terrace (for control of surface runoff, erosion, or both). A broad surface channel or embankment constructed across the slopes, on or approximately on contour lines, at specific intervals. The terrace intercepts surplus surface runoff and retards it so the water will infiltrate or will flow to an outlet at nonerosive velocity.

Terrace (geologic). An old alluvial plain, usually flat or smooth, bordering a stream; seldom subject to overflow; frequently a terrace is called a second bottom.

Texture. Size of individual particles making up the soil mass. The various soil separates are the size groups, as sand, silt, and clay. A coarse-textured soil is one high in sand; a fine-textured soil has a large proportion of clay.

Type, soil. A group of soils having genetic horizons similar as to differentiating characteristics, including texture and arrangement in the soil profile, and developed from a particular type of parent material.

Upland (geologic). Land consisting of material unworked by water in recent geologic time and ordinarily lying at higher elevations than the alluvial plain or stream terrace.

Literature Cited

(1) FENNEMAN, NEVIN M.
1938. PHYSIOGRAPHY OF EASTERN UNITED STATES. 714 pp., illus. New York and London.

(2) JONAS, ANNA I.
1932. KYANITE IN VIRGINIA. GEOLOGY OF THE KYANITE BELT OF VIRGINIA. Va. Geol. Survey Bul. 38: 1-38, illus.

(3) KELLOGG, CHARLES E.
1941. THE SOILS THAT SUPPORT US. 370 pp., illus. New York. (Reprinted, 1956.)

(4) MARBUT, C. F.
1935. SOILS OF THE UNITED STATES. U. S. Dept. Agr. Atlas of Amer. Agr., pt. 3, Adv. Sheets No. 8, 98 pp., illus.

(5) SIMONSON, ROY W.
1950. DESCRIPTION OF MOTTLING IN SOILS. Soil Sci. 71: 187-192, illus. (Reprinted, 1951.)

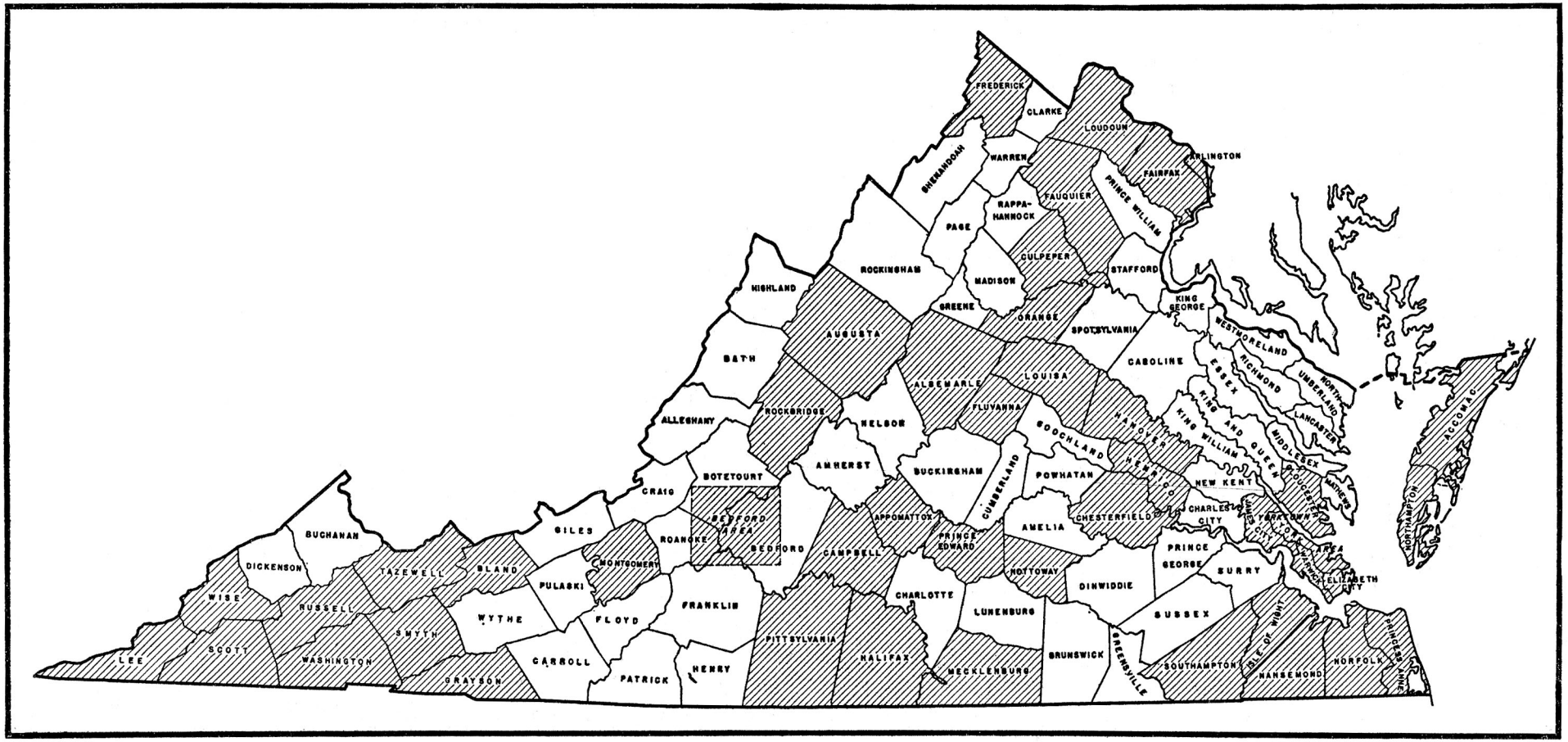
(6) ———
1950. GENESIS AND CLASSIFICATION OF RED-YELLOW PODZOLIC SOILS. Soil Sci. Soc. Amer. Proc. 14: 316-319.

(7) SOIL SURVEY STAFF.
1951. SOIL SURVEY MANUAL. U. S. Dept. Agr. Handbook 18, 503 pp., illus.

(8) THORP, JAMES and SMITH, GUY D.
1949. HIGHER CATEGORIES OF SOIL CLASSIFICATION: ORDER, SUBORDER, AND GREAT SOIL GROUPS. Soil Sci. 67: 117-126.

(9) UNITED STATES DEPARTMENT OF AGRICULTURE.
1938. SOILS AND MEN. U. S. Dept. Agr. Yearbook, 1232 pp., illus.

(10) WILLIAMS, HARRISON
1938. LEGENDS OF LOUDOUN. AN ACCOUNT OF THE HISTORY AND HOMES OF A BORDER COUNTY OF VIRGINIA'S NORTHERN NECK. 248 pp., illus. Richmond, Va.



Areas surveyed in Virginia shown by shading. Part of Loudoun County was included in the Leesburg Area, which was surveyed in 1903.

Accessibility Statement

The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The USDA Target Center can convert USDA information and documents into alternative formats, including Braille, large print, video description, diskette, and audiotape. For more information, visit the TARGET Center's Web site (http://www.targetcenter.dm.usda.gov/) or call (202) 720-2600 (Voice/TTY).

Nondiscrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the basis of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, whether all or part of an individual's income is derived from any public assistance program, or protected genetic information. The Department prohibits discrimination in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

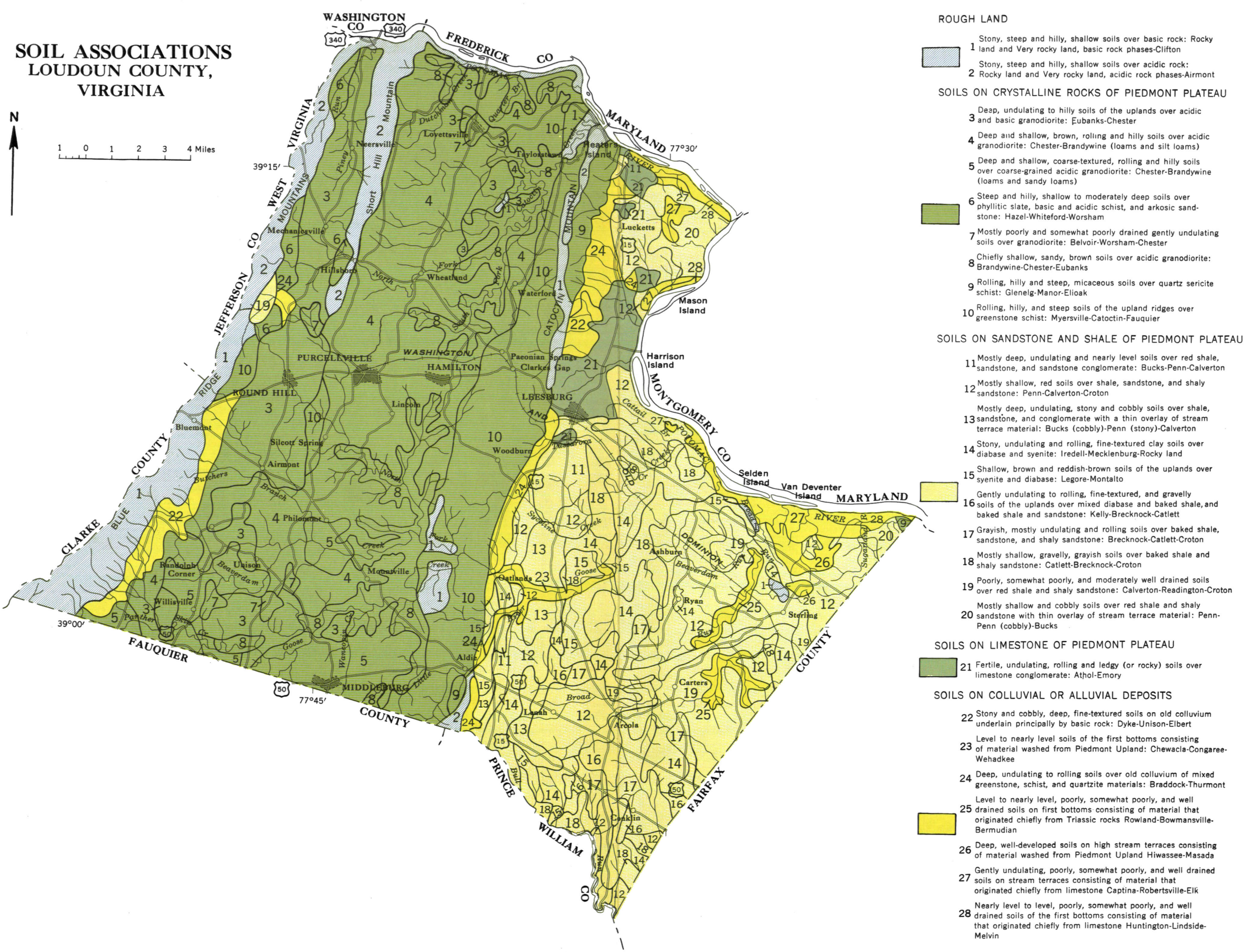
If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

SOIL ASSOCIATIONS
LOUDOUN COUNTY, VIRGINIA



ROUGH LAND

1 Stony, steep and hilly, shallow soils over basic rock: Rocky land and Very rocky land, basic rock phases-Clifton

2 Stony, steep and hilly, shallow soils over acidic rock: Rocky land and Very rocky land, acidic rock phases-Airmont

SOILS ON CRYSTALLINE ROCKS OF PIEDMONT PLATEAU

3 Deep, undulating to hilly soils of the uplands over acidic and basic granodiorite: Eubanks-Chester

4 Deep and shallow, brown, rolling and hilly soils over acidic granodiorite: Chester-Brandywine (loams and silt loams)

5 Deep and shallow, coarse-textured, rolling and hilly soils over coarse-grained acidic granodiorite: Chester-Brandywine (loams and sandy loams)

6 Steep and hilly, shallow to moderately deep soils over phyllitic slate, basic and acidic schist, and arkosic sandstone: Hazel-Whiteford-Worsham

7 Mostly poorly and somewhat poorly drained gently undulating soils over granodiorite: Belvoir-Worsham-Chester

8 Chiefly shallow, sandy, brown soils over acidic granodiorite: Brandywine-Chester-Eubanks

9 Rolling, hilly and steep, micaceous soils over quartz sericite schist: Glenelg-Manor-Elioak

10 Rolling, hilly, and steep soils of the upland ridges over greenstone schist: Myersville-Catoctin-Fauquier

SOILS ON SANDSTONE AND SHALE OF PIEDMONT PLATEAU

11 Mostly deep, undulating and nearly level soils over red shale, sandstone, and sandstone conglomerate: Bucks-Penn-Calverton

12 Mostly shallow, red soils over shale, sandstone, and shaly sandstone: Penn-Calverton-Croton

13 Mostly deep, undulating, stony and cobbly soils over shale, sandstone, and conglomerate with a thin overlay of stream terrace material: Bucks (cobbly)-Penn (stony)-Calverton

14 Stony, undulating and rolling, fine-textured clay soils over diabase and syenite: Iredell-Mecklenburg-Rocky land

15 Shallow, brown and reddish-brown soils of the uplands over syenite and diabase: Legore-Montalto

16 Gently undulating to rolling, fine-textured, and gravelly soils of the uplands over mixed diabase and baked shale, and baked shale and sandstone: Kelly-Brecknock-Catlett

17 Grayish, mostly undulating and rolling soils over baked shale, sandstone, and shaly sandstone: Brecknock-Catlett-Croton

18 Mostly shallow, gravelly, grayish soils over baked shale and shaly sandstone: Catlett-Brecknock-Croton

19 Poorly, somewhat poorly, and moderately well drained soils over red shale and shaly sandstone: Calverton-Readington-Croton

20 Mostly shallow and cobbly soils over red shale and shaly sandstone with thin overlay of stream terrace material: Penn-Penn (cobbly)-Bucks

SOILS ON LIMESTONE OF PIEDMONT PLATEAU

21 Fertile, undulating, rolling and ledgy (or rocky) soils over limestone conglomerate: Athol-Emory

SOILS ON COLLUVIAL OR ALLUVIAL DEPOSITS

22 Stony and cobbly, deep, fine-textured soils on old colluvium underlain principally by basic rock: Dyke-Unison-Elbert

23 Level to nearly level soils of the first bottoms consisting of material washed from Piedmont Upland: Chewacla-Congaree-Wehadkee

24 Deep, undulating to rolling soils over old colluvium of mixed greenstone, schist, and quartzite materials: Braddock-Thurmont

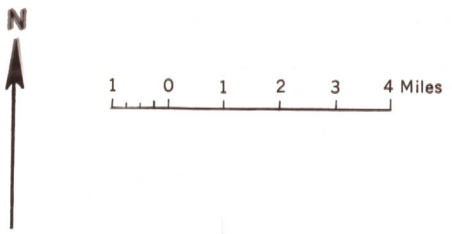
25 Level to nearly level, poorly, somewhat poorly, and well drained soils on first bottoms consisting of material that originated chiefly from Triassic rocks Rowland-Bowmansville-Bermudian

26 Deep, well-developed soils on high stream terraces consisting of material washed from Piedmont Upland Hiwassee-Masada

27 Gently undulating, poorly, somewhat poorly, and well drained soils on stream terraces consisting of material that originated chiefly from limestone Captina-Robertsville-Elk

28 Nearly level to level, poorly, somewhat poorly, and well drained soils of the first bottoms consisting of material that originated chiefly from limestone Huntington-Lindside-Melvin

INDEX TO MAP SHEETS
LOUDOUN COUNTY, VIRGINIA



WASHINGTON CO
340
340
FREDERICK CO
POTOMAC
Creek
Br
Insert Sheet 6
Run
Mountain
Dutchman
Quarter
Creek
MARYLAND
6
77°30′
RIVER
VIRGINIA
3
Neersville
4
Lovettsville
5
Taylorstown
Creek
Heaters Island
Piney
Hill
39°15′
WEST MOUNTAINS
Short
Catoctin
MOUNTAIN
7
8
9
10
Mechanicsville
Lucketts
15
CO
Hillsboro
North
Fork
Wheatland
Fork
Waterford
Mason Island
JEFFERSON
11
12
13
14
Insert Sheet 15
South
CATOCTIN
PURCELLVILLE
WASHINGTON
HAMILTON
Paeonian Springs
Clarkes Gap
Harrison Island
15
RIDGE
ROUND HILL
16
17
18
19
LEESBURG
AND
Lincoln
Cattail
Br
POTOMAC
CO
MONTGOMERY
COUNTY
Bluemont
Silcott Spring
Woodburn
Tuscurora
Creek
OLD
Cr
Selden Island
Van Deventer Island
MARYLAND
20
21
22
23
24
25
Airmont
Butchers
Branch
North
15
Broad
RIVER
Sugarland
Run
Philomont
Sycoline
Creek
Fork
Creek
DOMINION
Run
Run
CLARKE
BLUE
26
27
28
29
30
31
32
33
Ashburn
Randolph Corner
Unison
Beaverdam
Mountville
Creek
Oatlands
Goose
Beaverdam
Willisville
Ryan
Sterling
Panther
Skin
Cr
35
36
37
38
39
40
River
Run
34
39°00′
50
FAUQUIER
Goose
Waneopin Cr
Aldie
COUNTY
50
MIDDLEBURG
Little
Carters
77°45′
43
Broad
41
42
Lenah
Arcola
44
45
15
Bull
PRINCE
WILLIAM
CO
46
47
50
FAIRFAX
Conklin
48
Run

SOIL LEGEND

SYMBOL	NAME
Aa	Airmont stony loam, undulating phase
Ab	Airmont stony loam, rolling phase
Ac	Airmont stony loam, hilly phase
Ad	Athol gravelly silt loam, undulating phase
Ae	Athol gravelly silt loam, rolling phase
Af	Athol silt loam, undulating phase
Ag	Athol rocky silt loam, undulating phase
Ah	Athol rocky silt loam, rolling phase
Ak	Athol very rocky silt loam, undulating phase
Am	Athol very rocky silt loam, rolling phase
Ba	Belvoir loam
Bb	Bermudian silt loam
Bc	Bowmansville silt loam
Bd	Braddock cobbly loam, undulating phase
Be	Braddock cobbly loam, rolling phase
Bf	Braddock gravelly loam, undulating phase
Bg	Braddock gravelly loam, rolling phase
Bh	Brandywine loam and silt loam, rolling phases
Bk	Brandywine loam and silt loam, hilly phases
Bm	Brandywine loam and silt loam, eroded hilly phases
Bn	Brandywine loam and silt loam, steep phases
Bo	Brandywine sandy loam, rolling phase
Bp	Brandywine sandy loam, hilly phase
Br	Brandywine sandy loam, steep phase
Bs	Brandywine stony loam, rolling phase
Bt	Brandywine stony loam, hilly phase
Bu	Brandywine stony loam, eroded hilly phase
Bv	Brandywine stony loam, steep phase
Bw	Brandywine stony sandy loam, undulating phase
Bx	Brandywine stony sandy loam, rolling phase
By	Brandywine stony sandy loam, hilly phase
Bza	Brecknock gravelly silt loam, undulating phase
Bzb	Brecknock gravelly silt loam, rolling phase
Bzc	Buckingham stony fine sandy loam, rolling phase
Bzd	Buckingham stony fine sandy loam, steep phase
Bze	Bucks cobbly silt loam, undulating phase
Bzf	Bucks cobbly silt loam, rolling phase
Bzg	Bucks silt loam, undulating phase
Ca	Calverton silt loam, level phase
Cb	Calverton silt loam, undulating phase
Cc	Captina silt loam
Cd	Captina silt loam, high terrace phase
Ce	Catlett gravelly silt loam, undulating phase
Cf	Catlett gravelly silt loam, rolling phase
Cg	Catlett stony silt loam, undulating phase
Ch	Catlett stony silt loam, rolling phase
Ck	Catlett stony silt loam, eroded rolling phase
Cm	Catlett stony silt loam, hilly phase
Cn	Catoctin silt loam, rolling phase
Co	Catoctin silt loam, hilly phase
Cp	Catoctin silt loam, eroded hilly phase
Cr	Catoctin silt loam, steep phase
Cs	Catoctin silt loam, eroded steep phase
Ct	Catoctin stony silt loam, rolling phase
Cu	Catoctin stony silt loam, eroded rolling phase
Cv	Catoctin stony silt loam, hilly phase
Cw	Catoctin stony silt loam, eroded hilly phase
Cx	Catoctin stony silt loam, steep phase
Cy	Catoctin stony silt loam, eroded steep phase
Cza	Chester loam, undulating phase
Czb	Chester silt loam, undulating phase
Czc	Chester loam and silt loam, undulating phases
Czd	Chester loam and silt loam, rolling phases
Cze	Chester-Brandywine loams and sandy loams, undulating phases
Czf	Chester-Brandywine loams and sandy loams, rolling phases
Czg	Chewacla silt loam
Czh	Clifton stony silt loam, undulating and rolling phases
Czk	Congaree fine sandy loam
Czm	Congaree silt loam
Czn	Croton silt loam, level phase
Czo	Croton silt loam, undulating phase
Da	Dyke cobbly silty clay loam, undulating phase
Db	Dyke cobbly silty clay loam, eroded rolling phase
Ea	Elbert silt loam, level phase
Eb	Elbert silt loam, undulating phase
Ec	Elbert stony silt loam, colluvial phase
Ed	Elioak silt loam, undulating phase
Ee	Elioak silt loam, rolling phase
Ef	Elioak silt loam, hilly phase
Eg	Elk loam
Eh	Emory silt loam
Ek	Eubanks-Chester loams and silt loams, undulating phases
Em	Eubanks-Chester loams and silt loams, rolling phases
En	Eubanks-Chester stony loams and silt loams, undulating phases
Eo	Eubanks-Chester stony loams and silt loams, rolling phases
Ep	Eubanks-Chester stony loams and silt loams, hilly phases
Fa	Fauquier silt loam, undulating phase
Fb	Fauquier silt loam, rolling phase
Fc	Fauquier silt loam, hilly phase
Fd	Fauquier silty clay loam, eroded undulating phase
Fe	Fauquier silty clay loam, eroded rolling phase
Ff	Fauquier silty clay loam, severely eroded rolling phase
Fg	Fauquier silty clay loam, eroded hilly phase
Fh	Fauquier silty clay loam, severely eroded hilly phase
Fk	Fauquier stony silt loam, rolling phase
Fm	Fauquier stony silt loam, hilly phase
Ga	Glenelg silt loam, undulating phase
Gb	Glenelg silt loam, rolling phase
Gc	Glenelg silt loam, hilly phase
Ha	Hazel silt loam, rolling phase
Hb	Hazel silt loam, hilly phase
Hc	Hazel silt loam, steep phase
Hd	Hiwassee cobbly loam, undulating light surface variant
He	Hiwassee cobbly loam, rolling light surface variant
Hf	Hiwassee loam, undulating light surface variant
Hg	Huntington silt loam
Ia	Iredell-Mecklenburg silt loams, undulating phases
Ib	Iredell-Mecklenburg silt loams, eroded undulating phases
Ic	Iredell-Mecklenburg silt loams, rolling phases
Id	Iredell-Mecklenburg silt loams, eroded rolling phases
Ie	Iredell-Mecklenburg stony silt loams, undulating and rolling phases
Ka	Kelly silt loam, level phase
Kb	Kelly silt loam, undulating phase
La	Legore silt loam, undulating shallow phase
Lb	Legore silt loam, rolling shallow phase
Lc	Legore silt loam, hilly shallow phase
Ld	Legore stony silt loam, undulating shallow phase
Le	Legore stony silt loam, rolling shallow phase
Lf	Legore stony silt loam, hilly shallow phase
Lg	Legore stony silt loam, steep shallow phase
Lh	Lindside silt loam
Ma	Manassas silt loam
Mb	Manor silt loam, rolling phase
Mc	Manor silt loam, hilly phase
Md	Manor silt loam, steep phase
Me	Masada cobbly loam, undulating phase
Mf	Masada loam, undulating phase
Mg	Meadowville loam
Mh	Meadowville silt loam
Mk	Meadowville silt loam, cobbly variant
Mm	Melvin silt loam
Mn	Mixed alluvial land
Mo	Montalto silt loam, undulating shallow phase
Mp	Montalto stony silt loam, undulating shallow phase
Mr	Montalto stony silt loam, rolling shallow phase
Ms	Myersville silt loam, undulating phase
Mt	Myersville silt loam, rolling phase
Mu	Myersville silt loam, hilly phase
Mv	Myersville silt loam, eroded hilly phase
Mw	Myersville stony silt loam, undulating phase
Mx	Myersville stony silt loam, rolling phase
My	Myersville stony silt loam, steep phase
Mz	Myersville stony silt loam, eroded steep phase
Pa	Penn cobbly silt loam, undulating phase
Pb	Penn cobbly silt loam, rolling phase
Pc	Penn loam, undulating phase
Pd	Penn loam, rolling phase
Pe	Penn loam, hilly phase
Pf	Penn shaly silt loam, eroded undulating phase
Pg	Penn shaly silt loam, eroded rolling phase
Ph	Penn shaly silt loam, eroded hilly phase
Pk	Penn shaly silt loam, eroded steep phase
Pm	Penn silt loam, undulating phase
Pn	Penn silt loam, eroded undulating phase
Po	Penn silt loam, rolling phase
Pp	Penn silt loam, eroded rolling phase
Pr	Penn silt loam, hilly phase
Ps	Penn stony silt loam, eroded hilly phase
Pt	Penn stony silt loam, eroded steep phase
Ra	Readington silt loam, undulating phase
Rb	Robertsville silt loam
Rc	Rocky land, rolling acidic rock phase
Rd	Rocky land, hilly acidic rock phase
Re	Rocky land, rolling basic rock phase
Rf	Rocky land, hilly basic rock phase
Rg	Very rocky land, acidic rock phase
Rh	Very rocky land, basic rock phase
Rk	Rohrersville silt loam
Rm	Rohrersville stony silt loam
Rn	Rowland silt loam
Sa	Sequatchie loam
Sb	Stony colluvial land, rolling and hilly phases
Ta	Thurmont cobbly loam, undulating phase
Tb	Thurmont cobbly loam, rolling phase
Tc	Thurmont gravelly loam, undulating phase
Td	Thurmant gravelly loam, rolling phase
Te	Trego gravelly silt loam
Ua	Unison silt loam, undulating phase
Ub	Unison silt loam, rolling phase
Uc	Unison stony silt loam, undulating phase
Ud	Unison stony silt loam, rolling phase
Wa	Wehadkee silt loam
Wb	Whiteford silt loam, undulating phase
Wc	Whiteford silt loam, rolling phase
Wd	Whiteford silt loam, hilly shallow phase
We	Whiteford stony silt loam, rolling phase
Wf	Whiteford stony silt loam, hilly phase
Wg	Wickham loam
Wh	Worsham silt loam

Soils surveyed 1947-1951 by H. C. Porter, C. S. Coleman, W. J. Meyer, A. Y. Stokes, A. G. Sherrell, Virginia Agricultural Experiment Station, and H. H. Bailey, W. J. Welch, K. E. Fussell, A. H. Sbar, J. B. Carter, U. S. Department of Agriculture.
Correlation by W. S. Ligon, Soil Conservation Service.

Soil map constructed 1957 by Cartographic Division, Soil Conservation Service, USDA, from 1950 aerial photographs. Controlled mosaic based on Virginia plane coordinate system, north zone, Lambert conformal conic projection, 1927 North American datum.

N

P O T O M A C R I V E R

MARYLAND

WASHINGTON COUNTY

FREDERICK COUNTY

SANDY HOOK BRIDGE

Loudoun Heights

FORD

WATER

Buzzard Rock

White Rock

WEST VIRGINIA

MOUNTAINS

RIDGE

JEFFERSON COUNTY

APPALACHIAN TRAIL

BLUE

Piney

Ebenezer Church

L O V E T T S V I L L E

Short Hill

(Sheet 2)

(Sheet 3)

(Sheet 4)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

2

N

(Sheet 1)

(Inset sheet 6)

POTOMAC RIVER

FREDERICK COUNTY

MARY LAND

Goose Creek

Quarter Br

LOVETTSVILLE

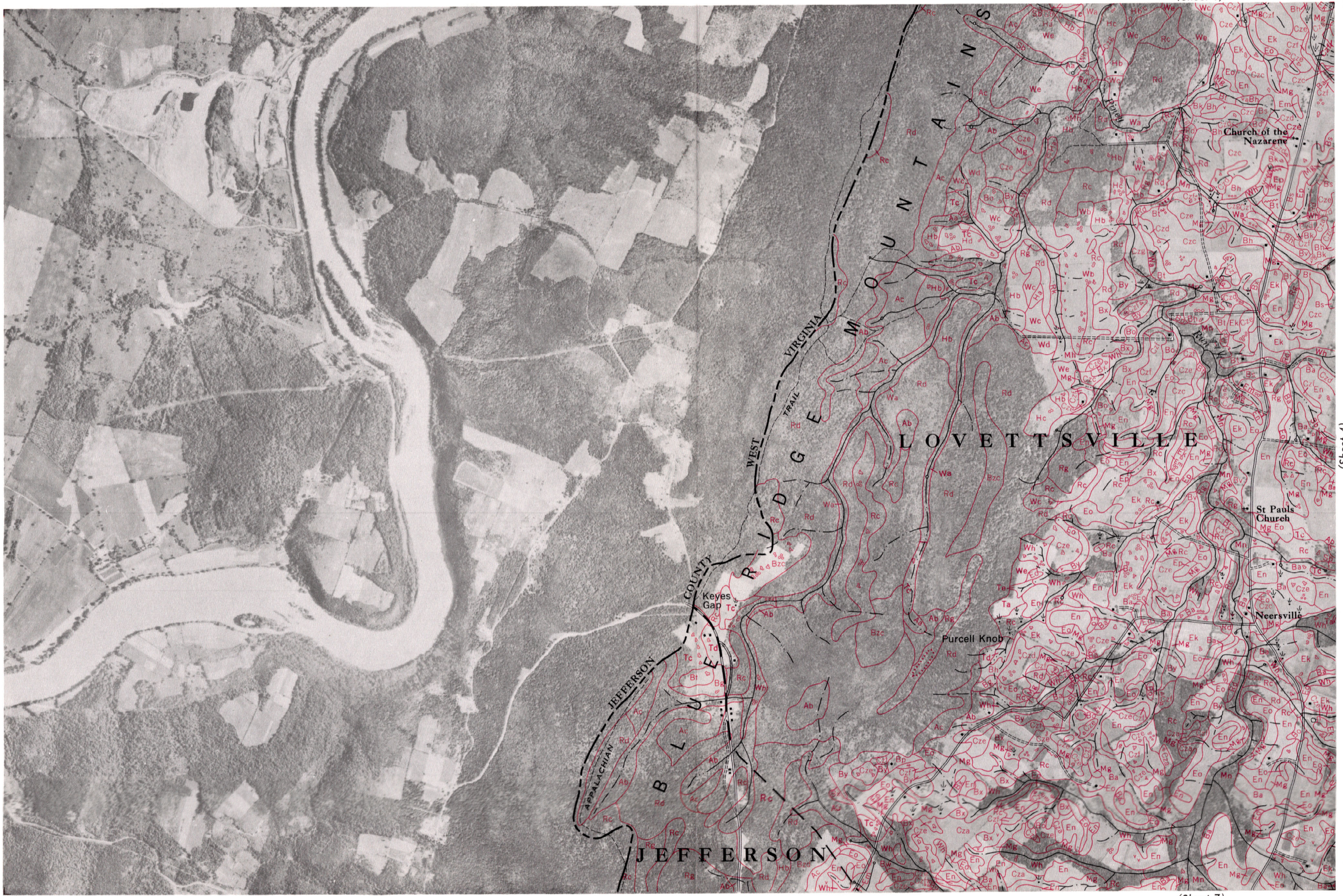
(Sheet 4) | (Sheet 5)

0 ½ 1 Mile

Scale 1:20 000

0 5000 Feet

(Sheet 1)



(Sheet 4)

(Sheet 7)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

LOUDOUN COUNTY, VIRGINIA

(Sheet 1) | (Sheet 2)

N

(Sheet 3)

(Sheet 5)

(Sheet 8)

0 1/2 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 2) (Inset sheet 6)

5

N

(Sheet 4)

(Sheet 6)

LOVETTSVILLE

POTOMAC RIVER

FREDERICK COUNTY

MARYLAND

CREEK

Bethel Church

FORD

FORD

Taylorstown

CATOCTIN MOUNTAIN

Furnace Mountain

IRON (ABANDONED)

LEESBURG

Quarter

Branch

15

15

(Sheet 9)

0 1/2 1 Mile

Scale 1:20000

0 5000 Feet

6

N

(Sheet 5)

POTOMAC RIVER

FREDERICK COUNTY MARYLAND

LOVETTSVILLE

(Sheet 2)

(Sheet 5)

FREDERICK COUNTY MARYLAND

POTOMAC RIVER

IRON (ABANDONED)

Furnace Mountain

LEESBURG

(Sheet 10)

0 1/2 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 3)

N

LOVETTSVILLE

RESERVOIR

WEST VIRGINIA TRAIL

APPALACHIAN

COUNTY

JEFFERSON

BLUE RIDGE MOUNTAINS

Salem Church

Mechanicsville

JEFFERSON

Short Hill

Copperhead Spring

(Sheet 8)

(Sheet 11)

0 ½ 1 Mile

Scale 1:20 000

0 5 000 Feet

LOUDOUN COUNTY, VIRGINIA

(Sheet 4)

N

L O V E T T S V I L L E

H i l l

h o r t

Mt Zion Church

Milltown

FORD

Rehobeth Church

Morrisonville

J E F F E R S O N

(Sheet 7)

(Sheet 9)

(Sheet 12)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 5)

N

(Sheet 8)

(Sheet 10)

Milltown

Milltown

Catoctin Creek

Catoctin Creek

Catoctin Creek

Catoctin Creek

Loyalty Store

Mt Pleasant Church

Bald Mountain

Valley Church

Bethel Church

Stumptown

LEESBURG

LOVETTSVILLE

MOUNTAIN

CATOCTIN

JEFFERSON

North Fork

South Fork

(Sheet 13)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 6)

N

(Sheet 9)

LIME KILN

L E E S B U R G

Faith Chapel

Lucketts

POTOMAC RIVER

FREDERICK COUNTY

MARYLAND

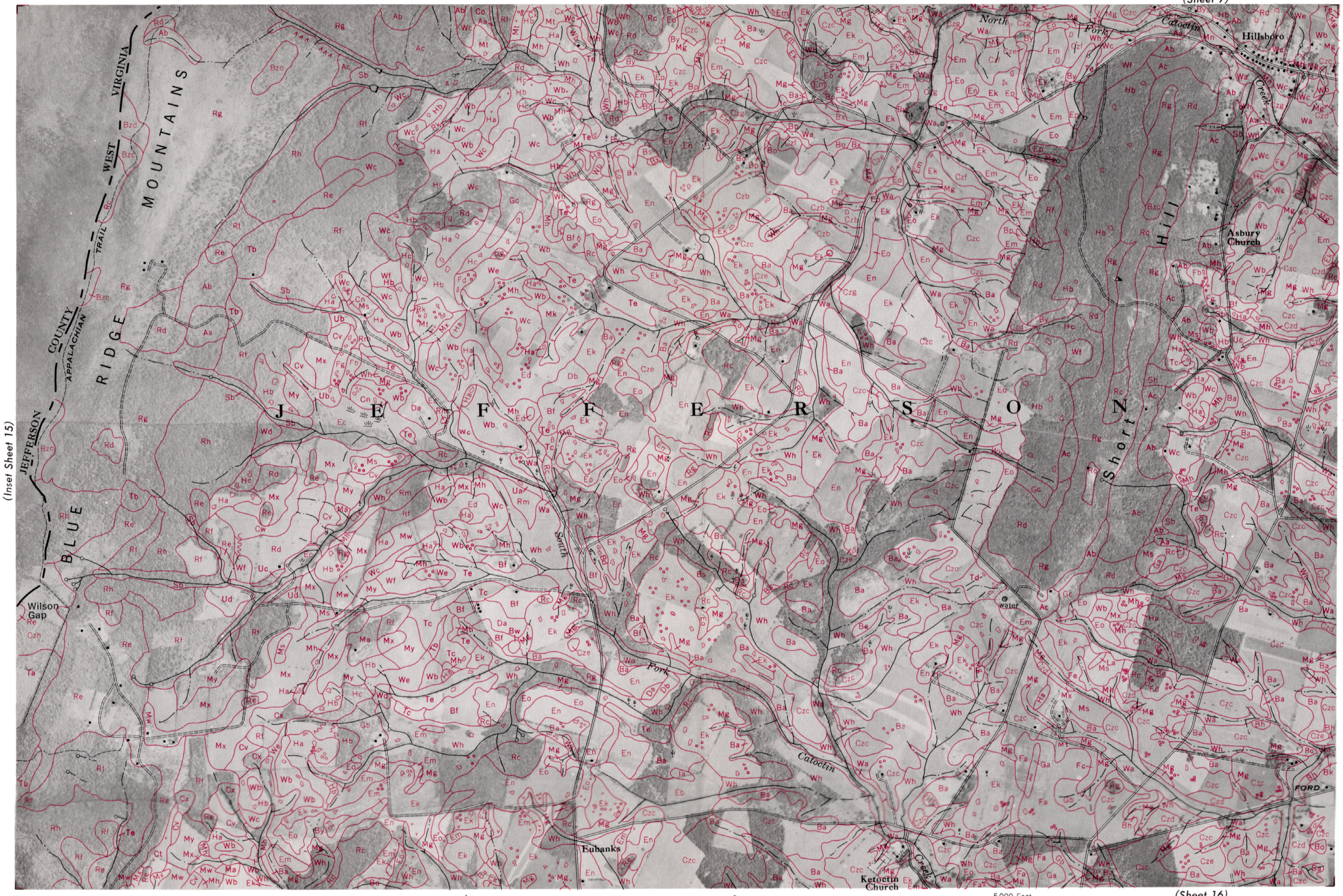
MONTGOMERY COUNTY

(Sheet 14)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet



(Inset Sheet 15)

(Sheet 12)

(Sheet 16)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

LOUDOUN COUNTY, VIRGINIA

(Sheet 8)

N

Arnold Grove Church

Wheatland

FORD

FORD

J E F F E R S O N

(Sheet 11)

(Sheet 13)

(Sheet 17)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 9)

(Sheet 12)

(Sheet 14)

(Sheet 18)

N

JEFFERSON

LEESBURG

CATOCTIN MOUNTAIN

Waterford

North Fork Catoctin Creek

South Fork

Limestone Branch

0 ½ 1 Mile

Scale 1:20 000

0 5000 Feet

(Sheet 10)

LOUDOUN COUNTY, VIRGINIA

N

(Sheet 13)

L E E S B U R G

RIVER

MARYLAND

COUNTY

MONTGOMERY

POTOMAC

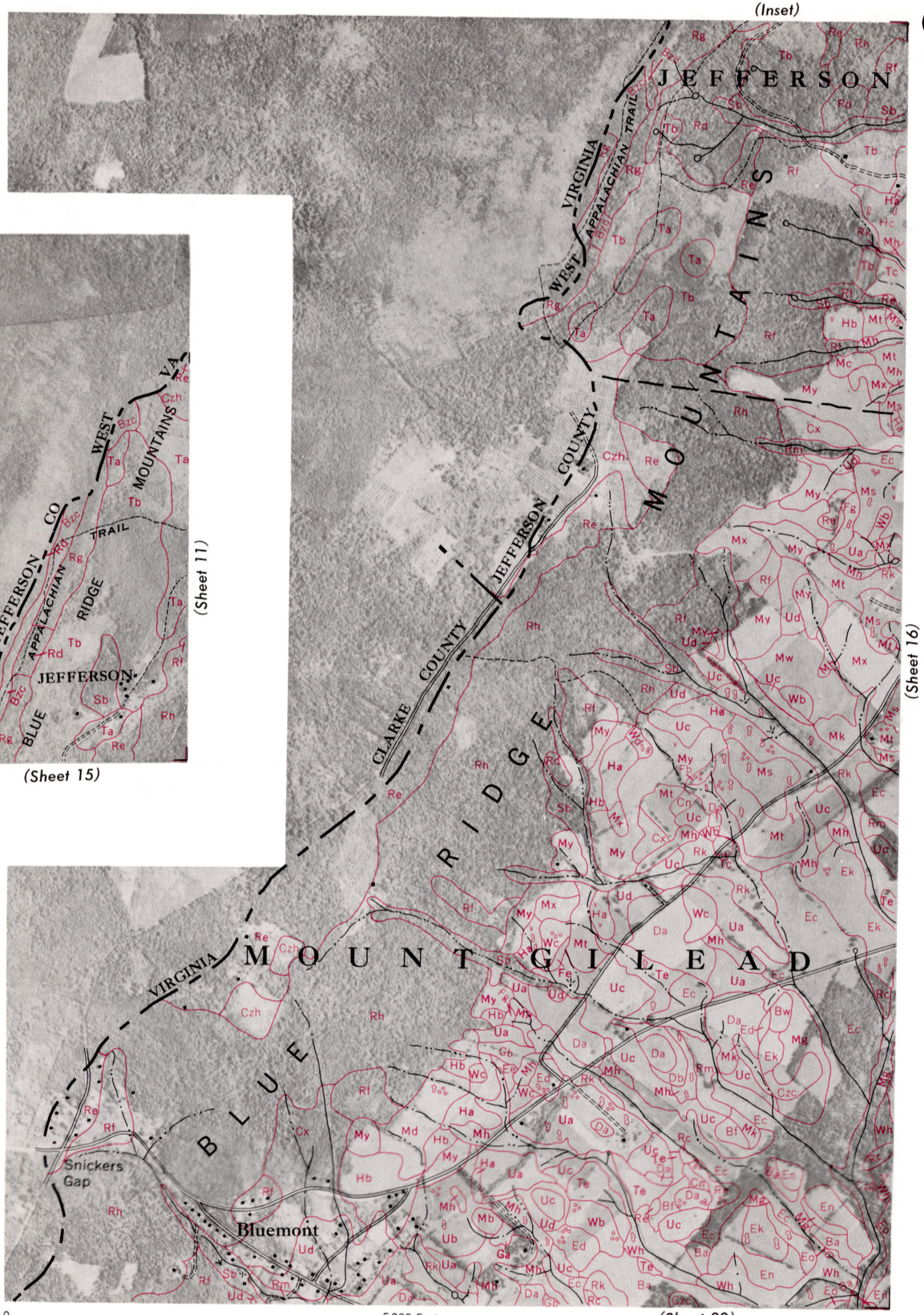
(Sheet 19)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Inset)



N

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

LOUDOUN COUNTY, VIRGINIA

(Sheet 11)

N

JEFFERSON

MOUNTGILEAD

Round Hill

Purcellville

Round Top

Simpsons Creek

South Fork Catoctin Creek

North Fork Goose Creek

Jacks Run

FORD

FORD

(Sheet 15)

(Sheet 17)

(Sheet 21)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

N

J E F F E R S O N

M O U N T G I L E A D

Ivandale

Hamilton

Purcellville

Lincoln

St Pauls Church

Harmony Church

Mt Olive Church

Catoctin Creek

South Fork

WASHINGTON AND OLD DOMINION

(Sheet 16)

(Sheet 18)

(Sheet 22)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

LOUDOUN COUNTY, VIRGINIA

(Sheet 13)

N

JEFFERSON

Paeonian Springs

WASHINGTON

Clarkes Gap

LEESBURG

MOUNT GILEAD

OLD DOMINION

Mill Branch

AIRFIELD

(Sheet 17)

(Sheet 19)

(Sheet 23)

0 ½ 1 Mile

Scale 1:20 000

0 5000 Feet

N

WHITES FERRY

POTOMAC

MONTGOMERY COUNTY MARYLAND

RIVER

Balls Bluff National Cemetery

L E E S B U R G

Catoctin Branch

FORT

(Sheet 18)

(Sheet 24)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

20

(Sheet 15)

N

Bluemont

M O U N T G I L E A D

M O U N T A I N S

B L U E R I D G E

M E R C E R

CLARKE COUNTY

Mt Weather

WATER

U S WEATHER BUREAU

Austins Grove Church

FORD

Butchers Branch

(Sheet 21)

(Sheet 27)

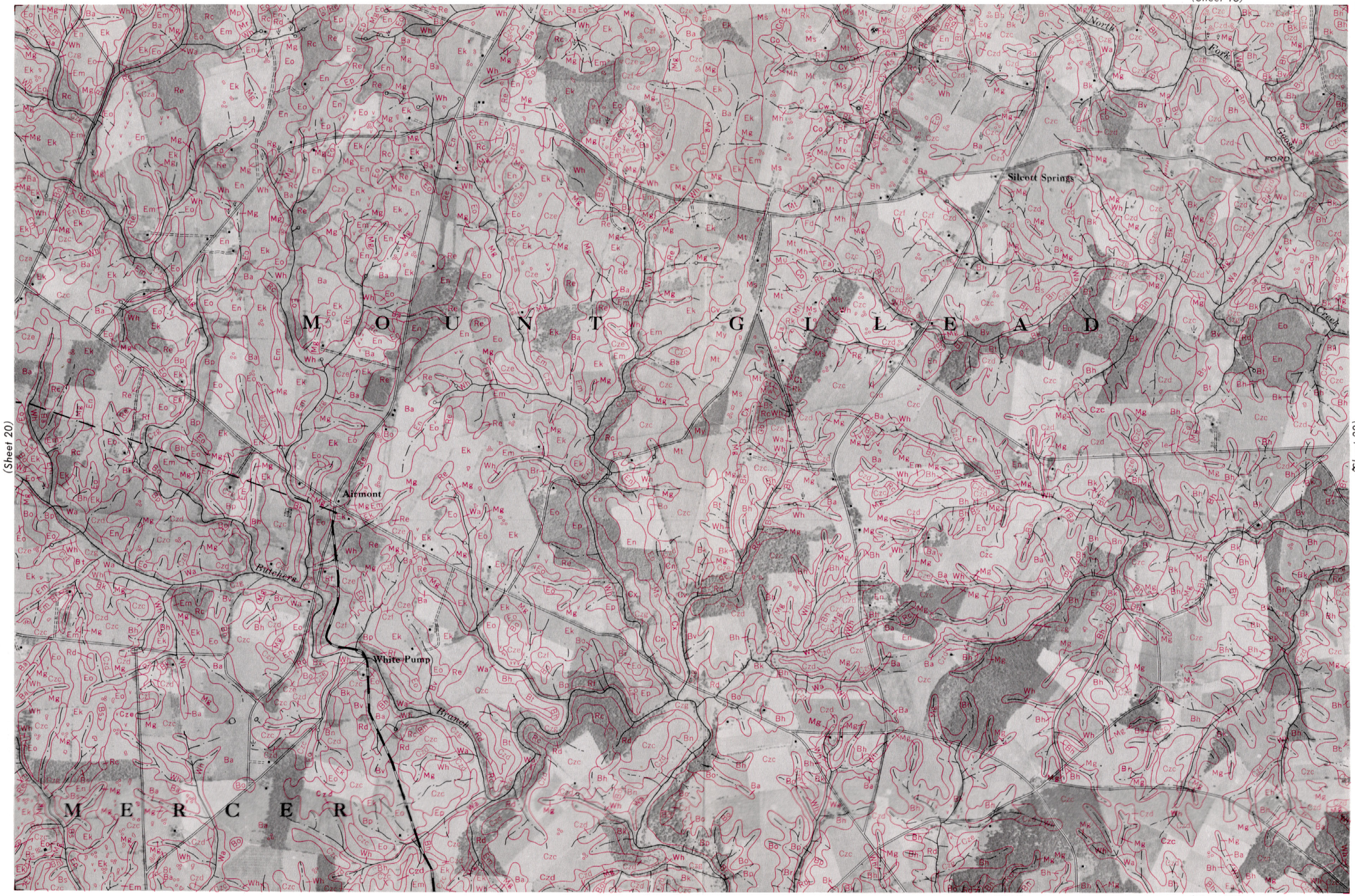
0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 16)

N



(Sheet 20)

(Sheet 22)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 28)

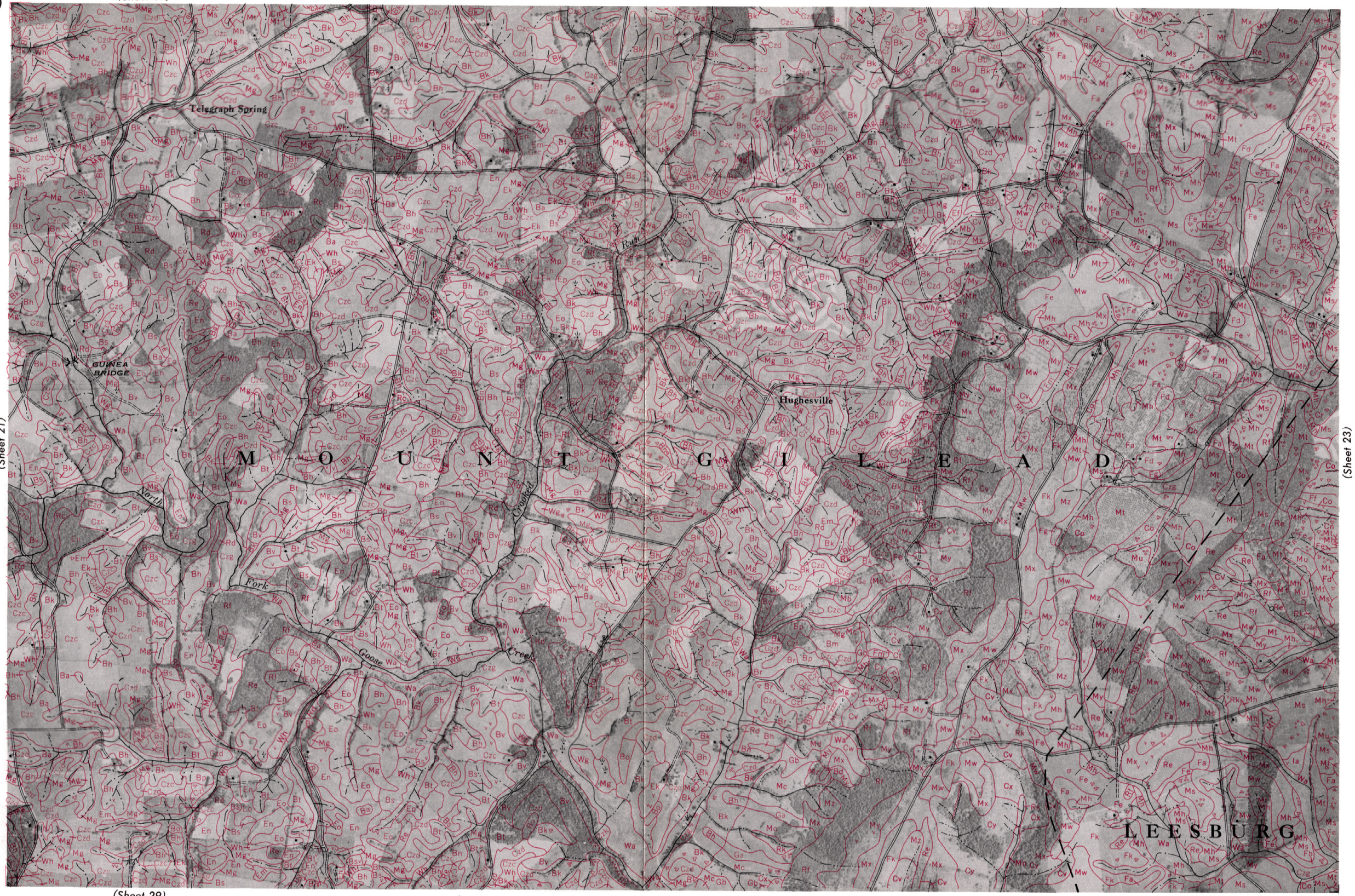
(Sheet 17)

LOUDOUN COUNTY, VIRGINIA

N

(Sheet 21)

(Sheet 23)



(Sheet 29)

0 ½ 1 Mile

Scale 1:20 000

0 5 000 Feet

MOUNT GILEAD

LEESBURG

Woodburn School

Woodburn

Mountain

Hogback

Ridge

Dry Mill Branch

Tuscarora Creek

Sycoline Creek

Town Branch

WASHINGTON AND OLD DOMINION

W & O D

Lawson

Union Church

FORD

N

(Sheet 22)

(Sheet 24)

(Sheet 30)

0 ½ 1 Mile

Scale 1:20 000

0 5000 Feet

(Sheet 19)

N

L E E S B U R G

B R O A D R U N

POTOMAC RIVER

MONTGOMERY COUNTY

MARYLAND

CREEK

Cattail

Browns

TUSCARORA

WASHINGTON AND OLD DOMINION

SYCOLINE

GOOSE

Trap Rock

ARLINGTON STONE QUARRY

Ashburn Junction

(Sheet 23)

(Sheet 25)

(Sheet 31)

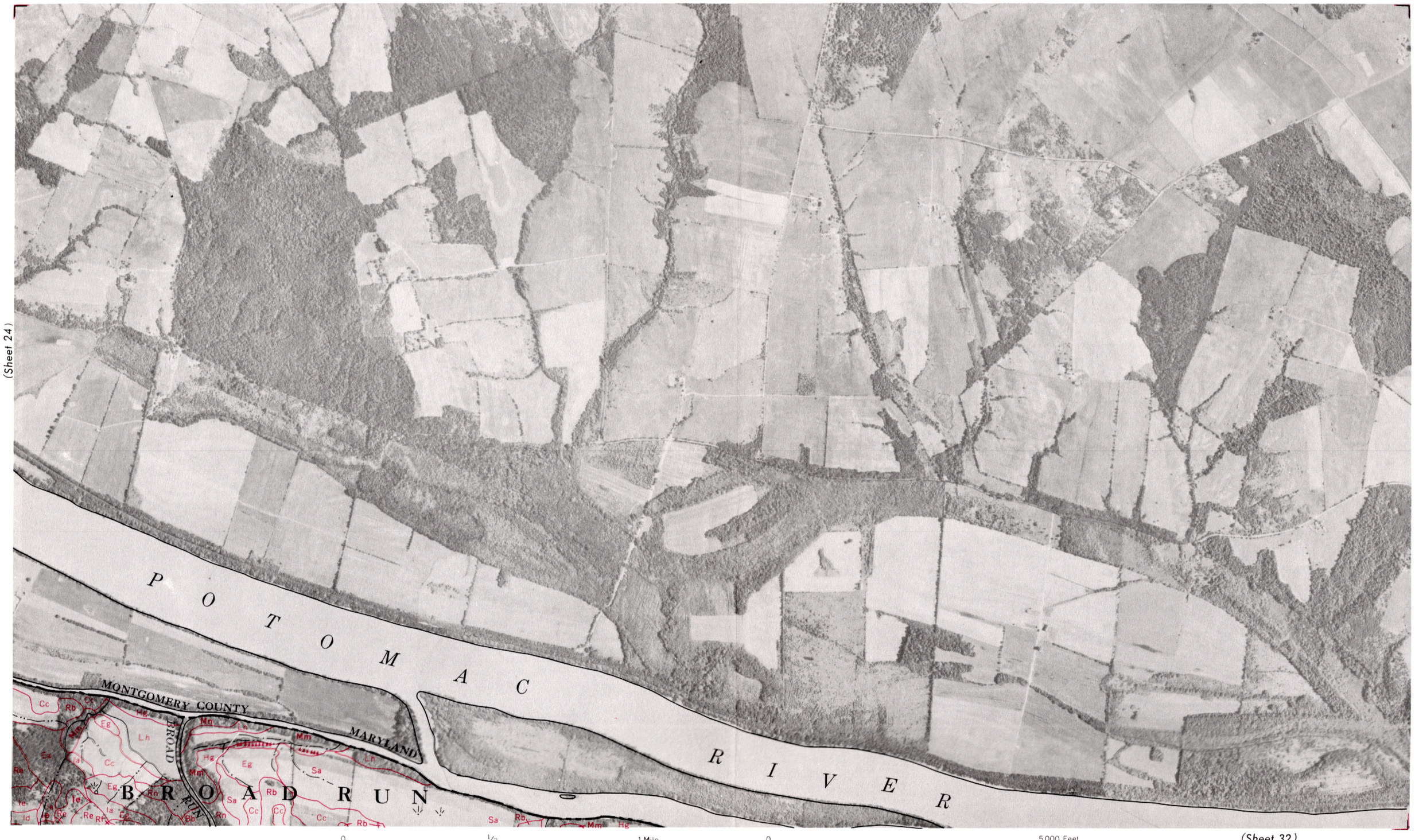
0 ½ 1 Mile

Scale 1:20 000

0 5 000 Feet

N

(Sheet 24)



0 1/2 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 32)

LOUDOUN COUNTY, VIRGINIA

N

CLARKE COUNTY

BLUE RIDGE MOUNTAINS

M E R C E R

CLARKE COUNTY

Czh Rh Re Rf Sb Ud Ua Ub Uc Db Da My Mx Mw Mh Mg Ec Cv Cx Cze Bo Bh Wh Rc Ev Ef Fb Fc Mt

(Sheet 27)

(Sheet 34)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 20)

N

(Sheet 26)

(Sheet 28)

Mt Weather

BUREAU OF MINES STATION

(EXPERIMENTAL MINE)

CLARKE COUNTY

BLUE RIDGE MOUNTAINS

Trapp

Littletown

Ebenezer Church

OTLEY BRIDGE

Bloomfield

Howardsville

Randolph Corner

FORD

Beaverdam Creek

MERCER

Branch

(Sheet 35)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

LOUDOUN COUNTY, VIRGINIA

(Sheet 21)

N

M O U N T G I L E A D

Philomont

FORD

Beaverdam Branch

Butchers Branch

Beaverdam Creek

FORD

M E R C E R

Unison

Beaverdam Creek

FORD

(Sheet 27)

(Sheet 29)

(Sheet 36)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 22)

(Sheet 28)

(Sheet 30)

(Sheet 37)

N

MOUNTAIN

MIDDLEBURG

LEESBURG

North Fork

Regular Church

Mount Gilead

North Fork

Goose Creek

Beaverdam

FORD

ROCK

GOOSE CREEK

Mountville

Mountville Church

LIMESTONE

GOOSE CREEK

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 23)

LOUDOUN COUNTY, VIRGINIA

N

(Sheet 29)

(Sheet 31)

Oatland School

Mountain Gap

Leesville

Sycoline Church

Sycoline Creek

Oatlands

GOOSE CREEK

LITTLE RIVER

GOOSE CREEK

Evergreen Mills

FORD

Sycolin

LEESBURG

MERCER

BROAD RUN

(Sheet 38)

0 ½ 1 Mile

Scale 1:20 000

0 5 000 Feet

(Sheet 24)

N

(Sheet 30)

(Sheet 32)

Belmont Park

Sycoline Creek

LEESBURG

MURRAYS FORD BRIDGE

GOOSE CR

Beaverdam Cr

WASHINGTON AND OLD DOMINION

Zion Church

Ashburn

Calvary Church

Russell Branch

Ruth Run

Beaverdam Run

B R O A D R U N

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 39)

N

POTOMAC RIVER

MONTGOMERY COUNTY MARYLAND

BROAD RUN

Old Sugarland Run

Russell Br

Beaverdam Run

Nokes School

Smiths

W & O D

BROAD

FAIRFAX CO

(Sheet 31)

(Sheet 33)

(Sheet 40)

0 1/2 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 32)

N

0 1/2 1 Mile

Scale 1:20 000

0 5000 Feet

(Sheet 26)

LOUDOUN COUNTY, VIRGINIA

N

CLARKE COUNTY

Ashby Gap

BLUE RIDGE MOUNTAINS

FAUQUIER COUNTY

M E R C E R

Brookmeade

(Sheet 35)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 27)

N

MERCER

Willisville

Panther Skin Creek

Jefferson

Panther Rd

Skin Creek Rd

Goose Creek

Goose Creek Rd

Ford

GAS

FAUQUIER COUNTY

50

(Sheet 34)

(Sheet 36)

0 ½ 1 Mile

Scale 1:20 000

0 5 000 Feet

LOUDOUN COUNTY, VIRGINIA

N

(Sheet 35)

(Sheet 37)

(Sheet 41)

Beaverdam Cr

Mt Zion Church

St Louis

Banecker School

RACETRACK

Phillips Corner

GAS

GOOSE CREEK

FAUQUIER COUNTY

MERCER

Leithton

Foxcroft School

BENTONS BRIDGE

GOOSE CREEK

Polecat Hill

Ball Mill Creek

Wakeopin

GAS

0 1/2 1 Mile

Scale 1:20000 0 5000 Feet

(Sheet 29)

N

(Sheet 36)

(Sheet 38)

CARTERS BRIDGE

GOOSE CREEK

Goose Creek

Waxpool Rd

Full Gospel Church

MERCER

GAS

Sunny Bank

Dover

Little Beaver

Aldie

LITTLE RIVER

GAS

0 1/2 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 42)

(Sheet 30)

LOUDOUN COUNTY, VIRGINIA

N

GOOSE CR

Evergreen Mills

RIVER

LITTLE

MERCER

BROAD RUN

Oak Hill

Watson

Mitchell Store

Watson Church

GAS

GAS

(Sheet 37)

(Sheet 39)

(Sheet 43)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

N

Waxpool

Mt Hope Church

Beaverdam Creek

Ryan

Beaverdam Run

BROADRUN

GAS

GAS

Stony Hill

Horsepen Run

Broad Run Branch

NATIONAL BUREAU OF STANDARDS

(Sheet 38)

(Sheet 40)

(Sheet 44)

0 ½ 1 Mile

Scale 1:20 000

0 5 000 Feet

LOUDOUN COUNTY, VIRGINIA

(Sheet 32)

N

RUN

WASHINGTON

Cabin

BROAD

Branch

Sterling

B R O A D R U N

COUNTY

GAS

OLD

DOMINION

FAIRFAX

Oak Grove

Indian Creek

Horsepen Run

(Sheet 39)

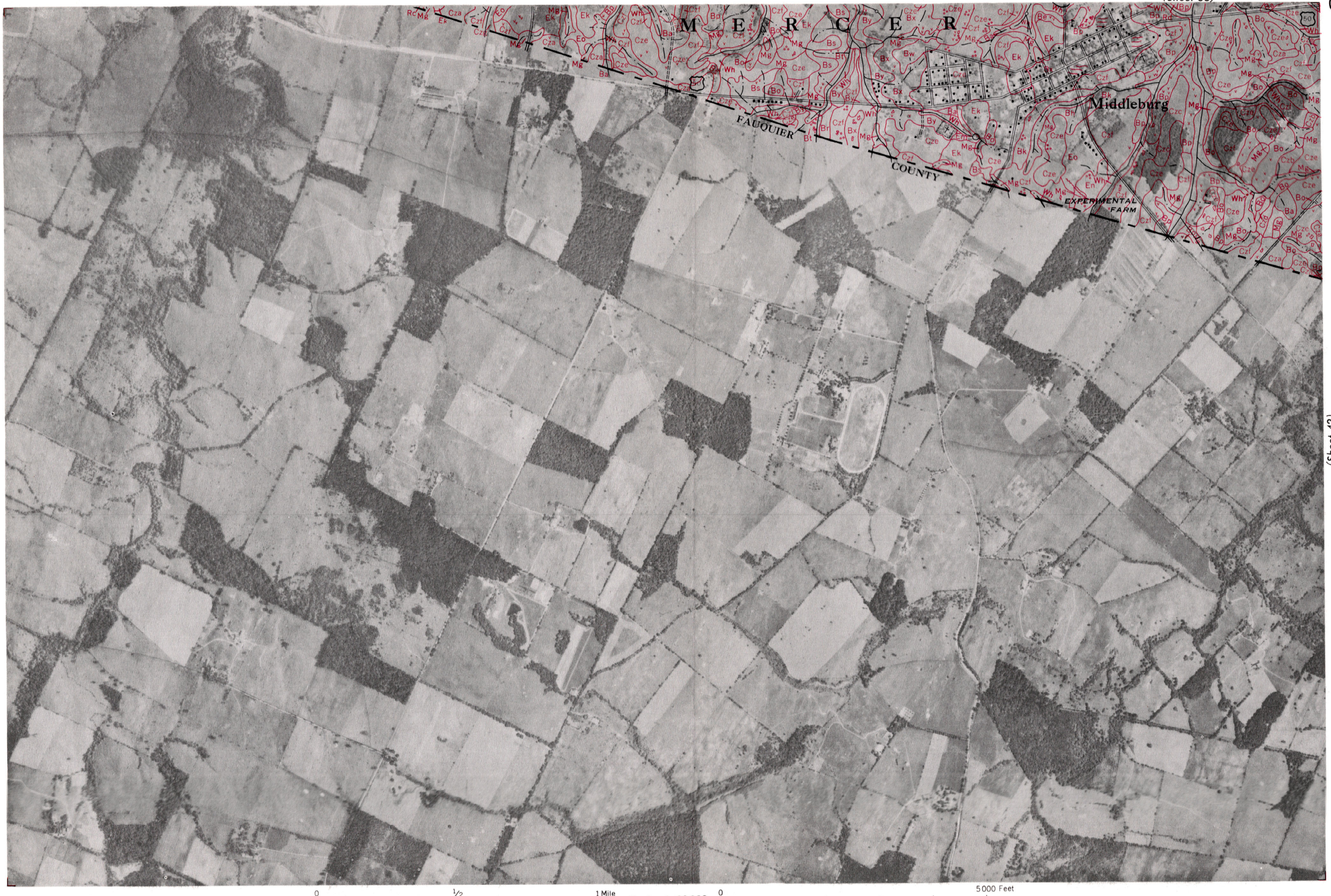
(Sheet 45)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 36)



(Sheet 42)

0 ½ 1 Mile Scale 1:20 000 0 5000 Feet

LOUDOUN COUNTY, VIRGINIA

(Sheet 37)

N

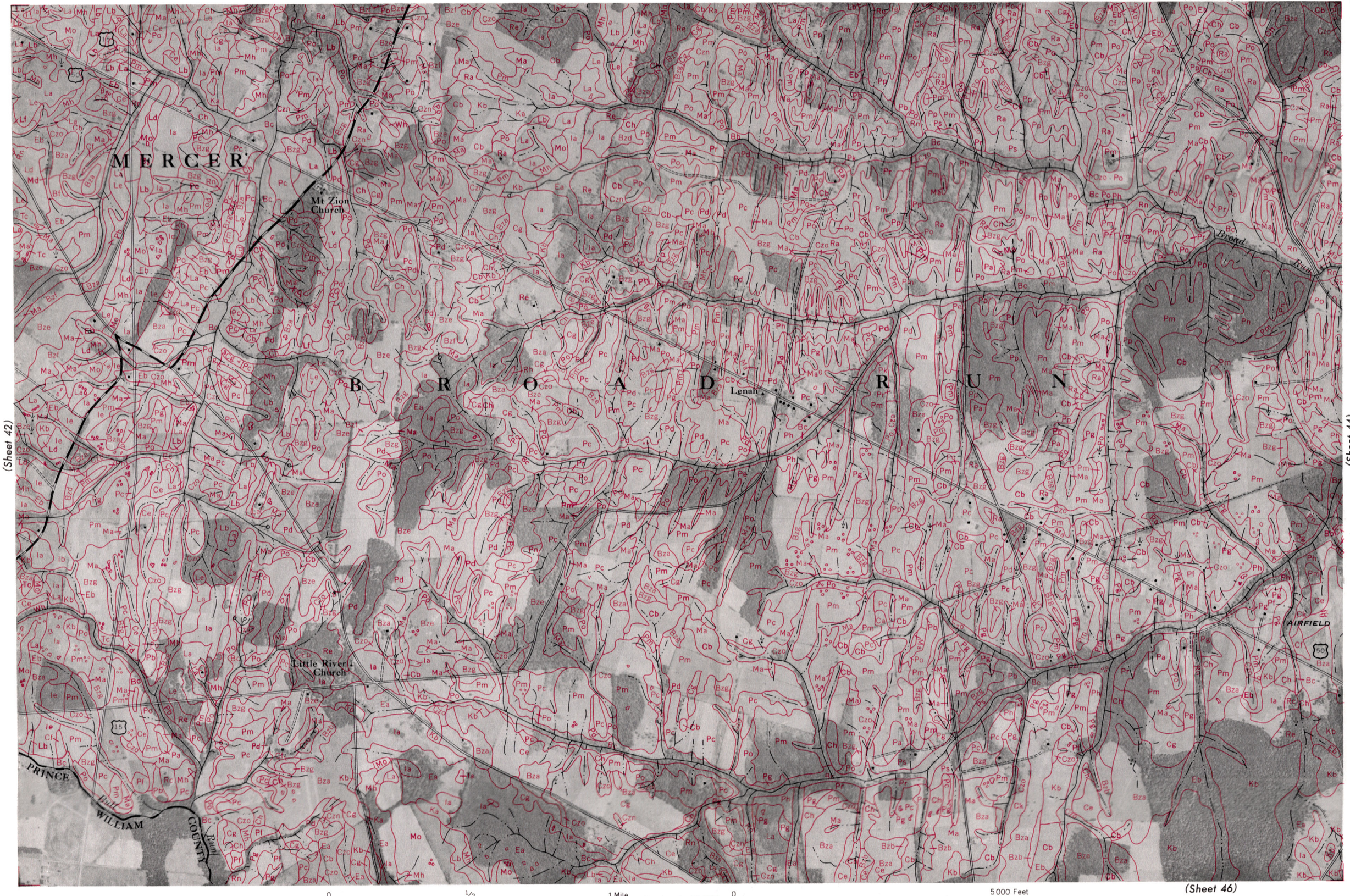
(Sheet 41)

(Sheet 43)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet



(Sheet 42)

(Sheet 44)

(Sheet 46)

N

0 ½ 1 Mile

Scale 1:20 000

0 5000 Feet

LOUDOUN COUNTY, VIRGINIA

(Sheet 39)

N

NATIONAL BUREAU OF STANDARDS

Carters

Broad Run

Bull Run

Arcola

Arcola School

BROAD RUN

Cedar Run

Bull Run

Stallion Branch

BLUE RIDGE AIRPORT

Willard Church

FAIRFAX COUNTY

50

(Sheet 43)

(Sheet 45)

(Sheet 47)

0 ½ 1 Mile

Scale 1:20 000

0 5000 Feet

N

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

LOUDOUN COUNTY, VIRGINIA

(Sheet 43)

N

BRADDOCK

PRINCE WILLIAM COUNTY

BULL RUN

(Sheet 47)

(Sheet 48)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 44)

N

B R O A D R U N

Pleasant Valley

Sand

FAIRFAX COUNTY

Conklin

Fairview Church

Rum

Elklick

(Sheet 46)

0 1/2 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 48)

LOUDOUN COUNTY, VIRGINIA

(Sheet 46) | (Sheet 47)

N

BROAD RUN

BULL RUN

WILLIAM

PRINCE

COUNTY

COUNTY

FAIRFAX

0 ½ 1 Mile

Scale 1:20 000

0 5000 Feet

LOUDOUN COUNTY, VIRGINIA

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Roads

- Good motor
- Poor motor
- Trail
- Marker, U. S. (33)

Railroads

- Single track
- Multiple track
- Abandoned

Bridges and crossings

- Road
- Trail, foot
- Railroad
- Ferry
- Ford
- Grade
- R. R. over
- R. R. under
- Tunnel

Buildings

- School
- Church
- Station

Mine and Quarry

- Shaft
- Dump
- Prospect

Pits, gravel or other

Power line

Pipeline

Cemetery

Dam

Levee

Tank

Forest fire or lookout station

Windmill

Canal lock (point upstream)

BOUNDARIES

- National or state
- County
- Township, civil
- Township, U. S.
- Section line, corner
- City (corporate)
- Reservation
- Land grant

DRAINAGE

Streams

- Perennial
- Intermittent, unclass.
- Crossable with tillage implements
- Not crossable with tillage implements

Canals and ditches (CANAL / DITCH)

Lakes and ponds

- Perennial
- Intermittent

Wells (flowing)

Springs

Marsh

Wet spot

RELIEF

Escarpments

- Bedrock
- Other

Prominent peaks

Depressions

	Large	Small
Crossable with tillage implements		
Not crossable with tillage implements		
Contains water most of the time		

SOIL SURVEY DATA

- Soil type outline and symbol (Dx)
- Gravel
- Stones
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land

Erosion

- Uneroded spot (U)
- Sheet, moderate (S)
- Sheet, severe (SS)
- Gully, moderate (G)
- Gully, severe (GG)
- Sheet and gully, moderate (SG)
- Wind, moderate
- Wind, severe
- Blowout
- Wind hummock
- Overblown soil

Gullies

Areas of alkali and salts

- Strong (A)
- Moderate (M)
- Slight (S)
- Free of toxic effect (F)
- Sample location (● 26)
- Saline spot